

**Report on the Status of Drought Preparedness & Mitigation
in Sub-Saharan Africa**

Volume 1: Synthesis

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ACRONYMS

ASALS	Arid and Semi- Arid Lands
CILSS	Permanent Inter-State Committee for Drought Control in the Sahel
DPM	Drought Preparedness and Mitigation
ENSO	El Niño –Southern Oscillation
EU	European Union
EW	Early Warning
FAO	Food and Agriculture Organization
IUCN	World Conservation Union
MS	Member States of IGAD
NAP	National Action Programmes
NEWC	National Early Warning Committee
NEWS	National Early Warning Systems
NEWUs	National Early Warning Units
NGOs	Non – Governmental Organizations
OFDA	The Office of Foreign Disaster Assistance –USAID
REWS	Regional Early Warning Systems
SADC	Southern Africa Development Community
SRAP	Sub – Regional Action Programmes
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
UNSO	UNDP Office to Combat Desertification and Drought
USAID	United States Agency for International Development
WFP	World Food Programme
WMO	World Meteorological Organization

Foreword

Drought is a perennial feature in many countries of Africa, spurring global efforts to develop more effective response strategies that emphasis preparedness and mitigation. For example, Chapter 12 of Agenda 21 (Managing Fragile Ecosystems: Combating desertification and drought) includes a programme entitled: Developing comprehensive drought preparedness and drought-relief schemes, including self-help arrangements, for drought-prone areas and designing programmes to cope with environmental refugees. The United Nations Convention to Combat Desertification (UNCCD) also refers to the need for affected countries to develop more effective measures to mitigate the effects of drought (Article 10).

The UNDP Office to Combat Desertification and Drought (UNSO) has developed a programme aimed at strengthening the capacity of affected African countries to respond pro-actively to drought, in the context of the National Action Programme (NAP) process. This support emphasizes three interlinked components, as follows:

1. Design of national drought policy frameworks, which spell out the range of policy measures, that the government will put in place to deal with recurrent droughts.
2. Elaboration of operational guidelines that translate the policy framework into concrete actions and measures, which clarify the roles and responsibilities of government entities, civil society, donors, and other parties in the event of drought. These measures should facilitate the allocation of resources to support actions.
3. Strengthening early warning systems and re-focussing them to reinforce contingency planning and mitigation strategies.
4. Integrating bio-physical data with socio-economic indicators on coping mechanisms and livelihood systems to support monitoring efforts.

Significant efforts have been made by many countries to mitigate the effects of drought, particularly in setting up early warning systems at both national and sub-regional levels. Nevertheless, the availability of early warning information has not always led to early action. A recurring problem has been the "stop and go" attitude adopted by some governments to drought planning, exemplified by the fact that national efforts to mitigate the effects of drought often fall by the wayside once the rains return. The lack of active involvement of affected local populations in planning response strategies result in their treatment as helpless vic-

tims needing assistance. Thus, strategies to mitigate the effects of drought often ignore what local people do to help themselves in times of drought, with the unintended effect of undermining local coping strategies and mechanisms and weakening local institutional capacity. The situation is perpetuated by policies at national level that favour food aid over proactive contingency planning, ignoring the need to build effective mitigation and response strategies at sub-national levels. As a consequence, planning for drought is frequently centralized at the national level, and early warning systems are largely designed to serve as tools for food aid planning as opposed to active contingency planning.

Goal and Methodology of the Assessment

In order to better define the priority areas for further UNSO/UNDP support for drought mitigation a comprehensive assessment of the status of DPM in sub-Saharan Africa prone to drought was undertaken. The anticipated use for the inventory will be to create awareness raising among decision-makers, technicians, and field staff of the importance of DPM. This awareness will in turn improve participation in and ownership of DPM programmes.

The assessment consisted of a desk review of the status of DPM based on published reports, interviews with key government and regional entities, donors, NGOs, founded on a working knowledge of respective countries. The following tasks were undertaken:

- Assessment of existing policies and strategies for drought preparedness and mitigation, and linkage with overall national development planning processes and other sectoral policies (e.g. food security, poverty eradication, natural resources management, particularly water).
- Review of institutional mechanisms at regional, national, and sub-national levels to respond to the effects of drought, including an assessment of existing contingency planning processes/mechanisms, and institutional mechanisms (i.e. regional and local) level;
- Documenting existing early warning systems, including assessment of the capacity for climate analysis and making long-range forecasts;
- Assessment of existing links to monitor and analyse environmental changes and the socio-economic implications;
- Inventory of the actions of the key players in DPM, including bilateral and multilateral donors, NGOs, sub-regional organizations, etc., and the identification of gaps in research for potential follow-up.

The following regions and countries were targeted:

- West Africa: Mauritania, Mali, Burkina Faso, Niger, Guinea Bissau, Gambia, Cape Verde, Senegal, Chad and Ghana.
- East Africa: Regional overview only.
- Southern Africa: Angola, Swaziland, Malawi, Botswana, Namibia, Zimbabwe, Lesotho, Mozambique, South Africa, Tanzania and Zambia.

For each of the three regions, national consultants and a regional consultant were hired to undertake the respective desk review. The national consultants undertook the country assessment based on common guidelines developed. The regional consultants prepared their perspective on the status of DPM.

The work was carried as a collaborative effort between UNO and OFDA (The Office of Foreign Disaster Assistance, USAID), who provided financial support and technical

inputs. The study was conducted through, and in full collaboration with, the sub-regional organizations, CILSS (The Permanent Interstate Committee for Drought Control in the Sahel - for West Africa) IGAD (Intergovernmental Authority on Development - for East Africa) and SADC (Southern African Development Community - for Southern Africa). Overall technical guidance and editing of the final reports was undertaken by Professor Donald Wilhite of the National Drought Mitigation Centre, University of Nebraska, USA.

The current publication constitutes the first of a three-volume publication and provides a broad summary of the assessment. A second and third volume, dealing with country reports for West and Southern Africa, respectively will follow shortly.

UNO
November 1999

INTRODUCTION

Drought is considered by many to be the most complex but least understood of all natural hazards, affecting more people than any other hazard (Hagman 1984). For example, in sub-Saharan Africa, the droughts of the early to mid-1980s were reported to have adversely affected more than 40 million people (Office of Foreign Disaster Assistance 1990). The country and regional reports that are part of this project give more specific information about the impacts of recent drought episodes, especially those of the early 1990s. For example, the 1991/92 drought in southern Africa affected 20 million people and resulted in a deficit of cereal supplies of more than 6.7 million tonnes (SADC 1992). One of the lessons from Africa and elsewhere is that drought results in significant impacts regardless of the level of development, although the character of these impacts will differ profoundly.

Drought is a normal feature of climate and its recurrence is inevitable. However, there remains much confusion within the scientific and policy community about its characteristics. It is precisely this confusion that explains, to some extent, the lack of progress in drought management in most parts of the world. This chapter is written to introduce the concept of drought to readers of this report. Many of the specific points included in this chapter are emphasized many times in the country and regional chapters for the select group of countries in Sub-Saharan Africa that are included in this report. The purpose of this chapter is to provide a foundation for the concept of drought that will help readers understand the complexity of this natural hazard. More specifically, the chapter will articulate the differences between drought and other natural hazards, the types and definitions of drought, and definitions of key components of the cycle of disaster management. Enhancing understanding of drought concepts should help readers understand why, according to Hagman (1984), the phenomenon is not better understood by scientists and policy makers. Through an improved understanding and awareness of the concept and characteristics of drought and its differences from other natural hazards, both scientists and policy makers will be better equipped to establish much-needed policies and plans whereby vulnerability can be reduced or stabilized for future generations.

Drought as a Natural Hazard

Drought differs from other natural hazards (e.g., floods,

tropical cyclones, and earthquakes) in several ways. First, since the effects of drought often accumulate slowly over a considerable period of time and may linger for years after the termination of the event, the onset and end of drought is difficult to determine. Because of this, drought is often referred to as a creeping phenomenon.

Tannehill (1947) notes:

We have no good definition of drought. We may say truthfully that we scarcely know a drought when we see one. We welcome the first clear day after a rainy spell. Rainless days continue for a time and we are pleased to have a long spell of such fine weather. It keeps on and we are a little worried. A few days more and we are really in trouble. The first rainless day in a spell of fine weather contributes as much to a drought as the last, but no one knows how serious it will be until the last dry day is gone and the rains have come again... we are not sure about it until the crops have withered and died.

Although Tannehill's book was written more than fifty years ago, climatologists continue to struggle with recognizing the onset of drought and scientists and policy makers continue to debate the basis (i.e., criteria) for declaring an end to a drought.

Second, the absence of a precise and universally accepted definition of drought adds to the confusion about whether or not a drought exists and, if it does, its degree of severity. Realistically, definitions of drought must be region and application (or impact) specific. This is one explanation for the scores of definitions that have been developed. Wilhite and Glantz (1985) analyzed more than 150 definitions in their classification study, and many more exist. In the chapters that follow, definitions of drought are given for various country settings. Although these definitions do not vary significantly, they do point out the various scientific and policy perspectives that exist in differing climatic, economic, social, and political settings.

Although definitions of drought are numerous, many do not adequately define drought in meaningful terms for scientists and policy makers. The thresholds for declaring drought are arbitrary in most cases (i.e., they are not linked to specific impacts in key economic sectors). For example, what is the significance of a threshold of 75 percent of normal precipitation over a period of three months or more? A definition

of this type would be especially misleading for locations with a strong seasonal component of annual precipitation. These types of problems are the result of a misunderstanding of the concept by those formulating definitions and the lack of consideration given to how other scientists or disciplines will eventually need to apply the definition in actual drought situations (e.g., assessments of impact in multiple economic sectors, drought declarations or revocations for eligibility to relief programs). Defining drought is clearly a problem in most African countries; the scientific basis for many of the definition currently in use is arbitrary in many cases.

Third, drought impacts are nonstructural and spread over a larger geographical area than are damages that result from other natural hazards. For example, a recent analysis of drought occurrence by the National Drought Mitigation Center in the United States for the forty-eight contiguous U.S. states demonstrated that severe and extreme drought affected more than 25 percent of the country in twenty-seven of the past one hundred years. This represents an area of 1,942,500 km² or more. Drought seldom results in structural damage, in contrast to floods, hurricanes, and earthquakes. For these reasons, the quantification of impacts and the provision of disaster relief are far more difficult tasks for drought than they are for other natural hazards. Emergency managers, for example, are more accustomed to dealing with structural and localized impacts, responding to these events by restoring communication and transportation channels, providing emergency medical supplies, ensuring safe drinking water, and so forth. The non-structural characteristic of drought impacts has certainly hindered the development of accurate, reliable, and timely estimates of severity and, ultimately, the formulation of drought contingency plans by most governments.

Hazard events have been ranked by Bryant (1991) on the basis of their characteristics and impacts. This ranking is summarized in Table 1. Key hazard characteristics used for this evaluation include an expression of the degree of severity, length of event, total areal extent, total loss of life, total economic loss, social effects, long-term impact, suddenness, and occurrence of associated hazards for thirty-one hazards. Although the ratings of the various hazards in Table 1 are subjective, the overall rank is useful because it provides an integrated assessment of hazard characteristics and the relationships between hazards. Because of the intensity, duration, and spatial extent of drought events and the magnitude of associated impacts, drought ranks very high. One can make a cogent argument, however, that total loss of life associated with drought in this case is significantly overesti-

mated because it includes deaths associated with famine. Drought does disrupt food production systems but is only one of several potential natural triggers for famine; other social triggers, such as civil strife and war, have been more important factors in recent decades.

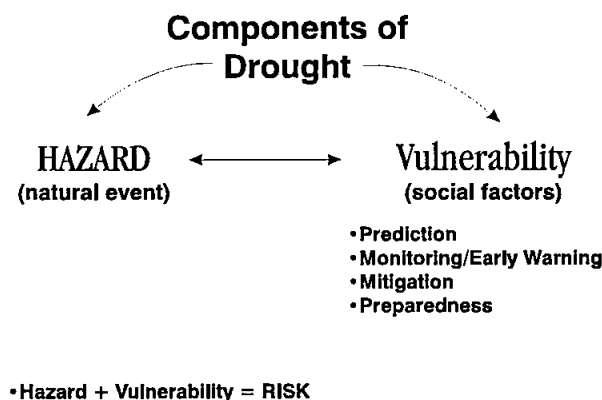
Drought is a normal, recurring feature of climate; it occurs in virtually all climatic regimes. It occurs in high as well as low rainfall areas. It is a temporary aberration, in contrast to aridity, which is a permanent feature of the climate and is restricted to low rainfall areas. Many people associate the occurrence of drought with most of Africa, India, China, the Great Plains of North America, and Australia; they have more difficulty visualizing drought in Southeast Asia, Brazil, western Europe, or the eastern United States, regions perceived by many to have a surplus of water. This fact emphasizes both the regional and relative nature of drought, a characteristic that will be discussed in more detail later in this chapter.

Drought is the consequence of a natural reduction in the amount of precipitation received over an extended period of time, usually a season or more in length, although other climatic factors (such as high temperatures, high winds, and low relative humidity) are often associated with it in many regions of the world and can significantly aggravate the severity of the event. Drought is also related to the timing (i.e., principal season of occurrence, delays in the start of the rainy season, occurrence of rains in relation to principal crop growth stages) and the effectiveness of the rains (i.e., rainfall intensity, number of rainfall events). Thus, each drought year is unique in its climatic characteristics and impacts. For example, Magalhães et al. (1988) have vividly pointed out the climatic differences between five consecutive drought years that occurred in northeast Brazil between 1979 and 1983, noting the critical linkages between the timing of rainfall and impacts.

Drought severity is dependent not only on the duration, intensity, and geographical extent of a specific drought episode, but also on the demands made by human activities and vegetation on a region's water supplies. The characteristics of drought, along with its far-reaching impacts, make its effects on society, economy, and environment difficult, though not impossible, to identify and quantify.

Many persons consider drought to be largely a natural or physical event. Figure 1 illustrates that, in reality, drought has both a natural and social component. The risk associated with drought for any region is a product of both the region's exposure to the event (i.e., probability of occur-

Figure 1. Components of Drought



rence at various severity levels) and the vulnerability of society to the event. The natural event (i.e., meteorological drought) is a result of the occurrence of persistent large-scale disruptions in the global circulation pattern of the atmosphere. Exposure to drought varies spatially and there is little, if anything, that we can do to alter drought occurrence. Vulnerability, on the other hand, is determined by social factors such as population, demographic characteristics, technology, policy, and social behaviour. These factors change over time, and thus vulnerability is likely to increase or decrease in response to these changes. Subsequent droughts in the same region will have different effects, even if they are identical in intensity, duration, and spatial characteristics, because societal characteristics will have changed. However, much can be done to lessen societal vulnerability to drought, and the various reports included in this document will discuss these actions from many country and disciplinary perspectives.

Defining Drought

Because drought affects so many economic and social sectors, scores of definitions have been developed by a variety of disciplines. In addition, because drought occurs with varying frequency in nearly all regions of the globe, in all types of economic systems, and in developed and developing countries alike, the approaches taken to define it also reflect regional and ideological differences (Wilhite 1992). Impacts also differ spatially and temporally, depending on the societal context of drought. A universal definition of drought is an unrealistic expectation. Wilhite and Glantz (1985) concluded that definitions of drought should reflect a regional bias since water supply is largely a function of climatic regime.

Definitions of drought can be categorized broadly as either conceptual or operational (Wilhite and Glantz 1985). Conceptual definitions are of the dictionary type, generally defining the boundaries of the concept of drought, and thus are generic in their description of the phenomenon. For example, the Encyclopedia of Climate and Weather (Schneider 1996) defines drought as 'an extended period - a season, a year, or several years -- of deficient rainfall relative to the statistical multi year mean for a region'. These types of definitions are useful for furthering our description of the phenomenon, but cannot be used to detect the onset of drought because of their lack of specificity. They do, however, incorporate the concept of the intensity and duration of the event and the need for regional bias.

Tannehill (1947) uses another conceptual definition that incorporates key elements of drought: a deficiency of precipitation from expected or normal that, when extended over a season or longer period of time, is insufficient to meet the demands of human activities, resulting in economic, social, and environmental impacts.

Operational definitions attempt to identify the precise characteristics and thresholds that define the onset, continuation, and termination of drought episodes, as well as their severity. These definitions are the foundation of an effective early warning system. They can also be used to analyze drought frequency, severity, and duration for a given historical period. An operational definition of agricultural drought might be one that compares daily precipitation to evapotranspiration (ET) rates to determine the rate of soil water depletion and then expresses these relationships in terms of drought effects on plant behaviour at various phenological stages of development. The effects of these meteorological conditions

Table 1. Ranking of hazard events by characteristics and impacts

Grading of Characteristics and Impacts ^a										
<u>Overall rank^b</u>	<u>Event</u>	<u>Degree of Severity</u>	<u>Length of event</u>	<u>Total areal extent</u>	<u>Total loss of life</u>	<u>Total economic loss</u>	<u>Social effect</u>	<u>Long-term impact</u>	<u>Sudden-ness</u>	<u>Occurrence of associated hazards</u>
1	Drought	1	1	1	1	1	1	1	4	3
2	Tropical cyclone	1	2	2	2	2	2	1	5	1
3	Regional flood	2	2	2	1	1	1	2	4	3
4	Earth-quake	1	5	1	2	1	1	2	3	3
5	Volcano	1	4	4	2	2	2	1	3	1
6	Extra-tropical storm	1	3	2	2	2	2	2	5	3
7	Tsunami	2	4	1	2	2	2	3	4	5
8	Bushfire	3	3	3	3	3	3	3	2	5
9	Expansive soils	5	1	1	5	4	5	3	1	5
10	Sea-level rise	5	1	1	5	3	5	1	5	4
11	Icebergs	4	1	1	4	4	5	5	2	5
12	Dust storm	3	3	2	5	4	5	4	1	5
13	Landslides	4	2	2	4	4	4	5	2	5
14	Beach erosion	5	2	2	5	4	4	4	2	5
15	Debris avalanches	2	5	5	3	4	3	5	1	5
16	Creep and soil-fluction	5	1	2	5	4	5	4	2	5
17	Tornado	2	5	3	4	4	4	5	2	5
18	Snowstorm	4	3	3	5	4	4	5	2	4
19	Ice at shore	5	4	1	5	4	5	4	1	5
20	Flash flood	3	5	4	4	4	4	5	1	5
21	Thunderstorm	4	5	2	4	4	5	5	2	4
22	Lightning strike	4	5	2	4	4	5	5	1	5
23	Blizzard	4	3	4	4	4	5	5	1	5
24	Ocean waves	4	4	2	4	4	5	5	3	5
25	Hail storm	4	5	4	5	3	5	5	1	5
26	Freezing rain	4	4	5	5	4	4	5	1	5
27	Localized strong wind	5	4	3	5	5	5	5	1	5
28	Subsidence	4	3	5	5	4	4	5	3	5
29	Mud and debris flows	4	4	5	4	4	5	5	4	5
30	Air-supported flows	4	5	5	4	5	5	5	2	5
31	Rockfalls	5	5	5	5	5	5	5	1	5

^a Hazard characteristics and impacts are graded on a scale of 1 (largest or greatest) to 5 (smallest or least significant)

^b Overall rank is based on average grading

on plant growth would be reevaluated continuously by agricultural specialists as the growing season progresses.

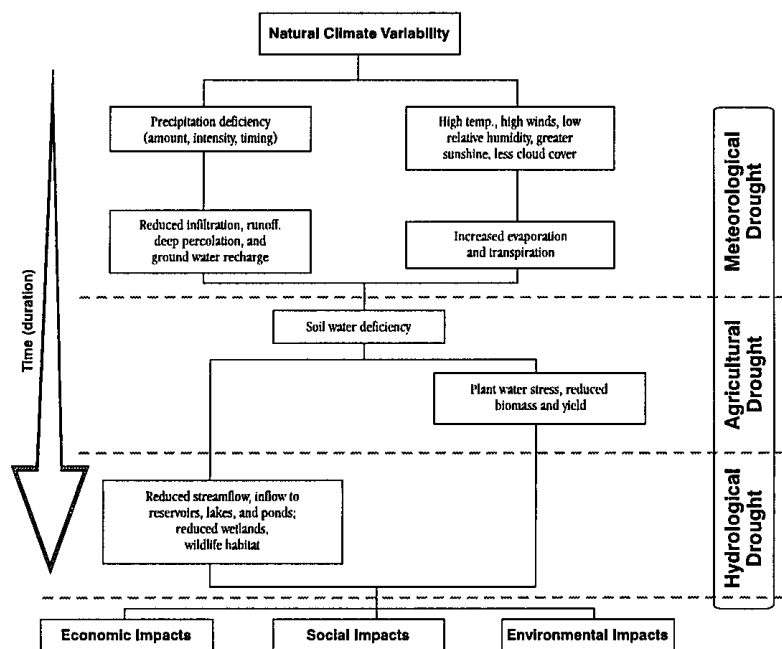
Many disciplinary perspectives of drought exist. Each discipline incorporates different physical, biological, and/or socioeconomic factors in its definition of drought. Because of these numerous and diverse disciplinary views, considerable confusion often exists over exactly what constitutes a drought (Glantz and Katz 1977). Research has shown that the lack of a precise and objective definition in specific situations has been an obstacle to understanding drought, which has led to indecision and/or inaction on the part of managers, policy makers, and others (Wilhite and Glantz 1985, Wilhite et al. 1986). It must be accepted that the importance of drought lies in its impacts. Thus definitions should be region and impact or application specific in order to be used in an operational mode by decision makers. A comprehensive review of drought definitions and indices can be found in a technical note published by the World Meteorological Organization (WMO) (1975). Other sources, such as Subrahmanyam (1967), Glantz and Katz (1977), Sandford (1979), Dracup et al. (1980), and Wilhite and Glantz (1985), can be consulted for a thorough discussion of the difficulties in defining drought.

Drought has been grouped by type as follows: meteorological, hydrological, agricultural, and socioeconomic (Wilhite and Glantz 1985). Figure 2 explains the relationship

between these various types of drought and the duration of the event. Droughts usually take three or more months to develop, but this time period can vary considerably, depending on the timing of the initiation of the precipitation deficiency. For example, a significant dry period during the winter season may have few, if any, impacts for many locales. However, if this deficiency continues into the growing season, the impacts may magnify quickly since low precipitation during the fall and winter season results in low soil moisture recharge rates, leading to deficient soil moisture at spring planting.

Meteorological (or climatological) drought is expressed solely on the basis of the degree of dryness (often in comparison to some normal or average amount) and the duration of the dry period. Thus, intensity and duration are the key characteristics of these definitions. Meteorological drought definitions must be considered as region specific since the atmospheric conditions that result in deficiencies of precipitation are climate regime dependent. For example, some definitions differentiate meteorological drought on the basis of the number of days with precipitation less than some specified threshold rather than the magnitude of the deficiency over some period of time (e.g., for Britain, fifteen days, none of which received as much as 0.25 mm of precipitation [British Rainfall Organization 1936]). Such a definition is unrealistic in those regions where precipitation distribution is seasonal and extended periods without rainfall

Figure 2. Relationship between various types of drought and duration of drought events.



are common. Most meteorological drought definitions relate actual precipitation departures to average amounts on monthly, seasonal, water year, or annual time scales. Human perceptions of these conditions are equally variable.

Agricultural drought links various characteristics of meteorological drought to agricultural impacts, focussing on precipitation shortages, differences between actual and potential evapotranspiration (ET), soil water deficits, and so forth. A plant's demand for water is dependent on prevailing weather conditions, biological characteristics of the specific plant, its stage of growth, and the physical and biological properties of the soil. An operational definition of agricultural drought should account for the variable susceptibility of crops at different stages of crop development. For example, deficient subsoil moisture in an early growth stage will have little impact on final crop yield if topsoil moisture is sufficient to meet early growth requirements. However, if the deficiency of subsoil moisture continues, a substantial yield loss may result.

The impacts of drought are crop specific because the most weather-sensitive phenological stages vary between crops. Planting dates and maturation periods also vary between crops and locations. A period of high temperature stress that occurs in association with dry conditions may coincide with a critical weather-sensitive growth stage for one crop while missing a critical stage for another crop. Agricultural planning can often reduce the risk of drought impact on crops by altering the crop, genotype, planting date, and cultivation practices.

Agriculture is usually the first economic sector to be affected by drought because soil moisture supplies are often quickly depleted, especially if the period of moisture deficiency is associated with high temperatures and windy conditions. The timing of rainfall during the growing season is critical in the determination of impacts. Crop or forage yields may be normal or above normal during a drought if rainfall is timely (i.e., coinciding with critical phenological stages) and effective (i.e., low intensity and high soil infiltration rate).

Hydrological droughts are associated with the effects of periods of precipitation shortfall on surface or subsurface water supply (i.e., streamflow, reservoir and lake levels, groundwater) rather than with precipitation shortfalls (Dracup et al. 1980, Kleme 1987). Hydrological droughts are usually out of phase or lag the occurrence of meteorological and agricultural droughts. Meteorological droughts result from precipitation deficiencies; agricultural droughts are largely the result of soil moisture deficiencies. More time elapses before

precipitation deficiencies are detected in other components of the hydrological system (e.g., reservoirs, groundwater). As a result, impacts are out of phase with those in other economic sectors. Also, water in hydrological storage systems (e.g., reservoirs, rivers) is often used for multiple and competing purposes (e.g., power generation, flood control, irrigation, recreation), further complicating the sequence and quantification of impacts. Competition for water in these storage systems escalates during drought, and conflicts between water users increase significantly.

The frequency and severity of hydrological drought is often defined at the river basin scale. Whipple (1966) defined a drought year as one in which the aggregate runoff is less than the long-term average runoff. Low-flow frequencies have been determined for many streams. If the actual flow for a selected time period falls below a certain threshold, then hydrological drought is considered to be in progress. However, the number of days and the level of probability that must be exceeded to define a hydrological drought period is somewhat arbitrary. These criteria will vary between streams and river basins.

The impacts of hydrological drought in an upstream portion of a river basin can also extend downstream as reduced streamflow may result in lower reservoir and groundwater levels at downstream locations, even though meteorological drought does not exist in this portion of the basin. Reductions in reservoir and groundwater levels in downstream portions of the basin may result in serious impacts on public water supplies, hydroelectric power production, recreation, transportation, agriculture, and other sectors. Conflicts between upstream and downstream water users may result, as has been the case in many river basins in the United States (see Oppen 1994 for an example from the Missouri River Basin). International water disputes often arise in situations where rivers transcend national borders, such as in the Mideast or between the United States and Mexico. There are numerous illustrations of this point in Africa.

The discussion up to this point has focused on the distinctions between the types of drought during its onset or development phase. During the termination phase of drought, the interrelationships between these drought types may differ. Figure 2 is also useful in understanding the termination phases of drought. During drought onset, agriculture is usually the first sector to experience drought because soil moisture will normally be the first component of the hydrological system to be affected. When the rains return, however, soil moisture levels may dramatically improve, and over a short

time frame. Thus, agricultural drought, particularly on rain-fed cropland, may end abruptly. Depending on the timing of these rains, however, impacts may linger because potential crop yields may already have been reduced substantially. Hydrological drought may continue for many months or years, since recharge of reservoirs and groundwater is a long process.

Finally, **socioeconomic drought** associates the supply and demand of some economic good or service with elements of meteorological, hydrological, and agricultural drought. Some scientists suggest that the time and space processes of supply and demand are the two basic processes that should be included in an objective definition of drought (Yevjevich 1967). For example, the supply of some economic good (e.g., water, hay, hydroelectric power) is weather dependent. In most instances, the demand for that good is increasing as a result of increasing population and/or per capita consumption. Therefore, drought could be defined as occurring when the demand for that good exceeds supply as a result of a weather-related supply shortfall (Sandford 1979). This concept of drought supports the strong symbiosis that exists between drought and human activities. Thus, the incidence of drought could increase because of a change in the frequency of the physical event, a change in societal vulnerability to water shortages, or both. For example, poor land-use practices such as overgrazing can decrease animal carrying capacity and increase soil erosion, which exacerbates the impacts of and vulnerability to future droughts. This example is especially relevant in semiarid regions (e.g., South Africa, Australia) and in areas of hilly or sloping terrain (e.g., Lesotho).

Drought Characteristics and Severity

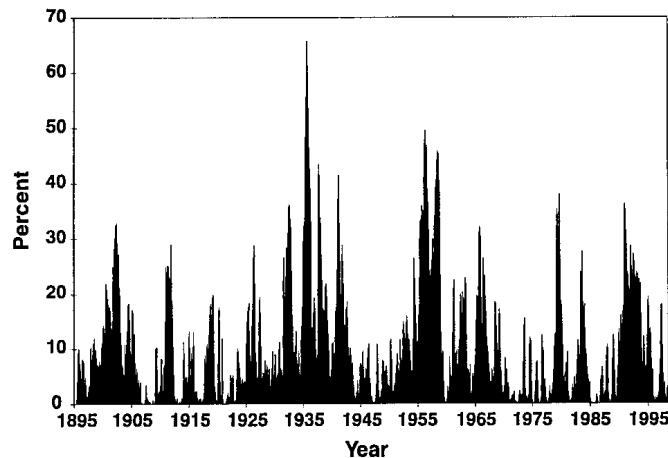
Droughts differ from one another in three essential characteristics: intensity, duration, and spatial coverage. Intensity refers to the degree of the precipitation shortfall and/or the severity of impacts associated with the shortfall. It is generally measured by the departure of some climatic index from normal and is closely linked to duration in the determination of impact. The simplest index in widespread use is the percent of normal precipitation. With this index, actual precipitation is compared to normal or average precipitation for time periods ranging from one to twelve or more months. Actual precipitation departures are normally compared to expected or average amounts on a monthly, seasonal, annual, or water year (October--September) time period. One of the principal difficulties with this (or any) index is the choice of the threshold below which the deficiency of precipitation

must fall (e.g., 75 percent of normal) to define the onset of drought. Thresholds are usually chosen arbitrarily. In reality, they should be linked to impact. Many indices of drought are in widespread use today, such as the decile approach (Gibbs 1967, Lee 1979, Coughlan 1987) used in Australia, the Palmer Drought Severity Index and Crop Moisture Index (Palmer 1965 and 1968, Alley 1984) in the United States, and the Yield Moisture Index (Jose et al. 1991) in the Philippines and elsewhere. A relatively new index that is gaining increasing popularity in the United States is the Standardized Precipitation Index (SPI), developed by McKee et al. (1993 and 1995). For a comparison of several popular meteorological indices, see Olidapo (1985).

Another distinguishing feature of drought is its duration. Droughts usually require a minimum of two to three months to become established but then can continue for months or years. The magnitude of drought impacts is closely related to the timing of the onset of the precipitation shortage, its intensity, and the duration of the event. The five-year (1979-83) drought in northeast Brazil is a good case in point. In this series of years, 1979 and 1980 were both drought years in the classic sense (i.e., a significant deficiency during the principal rainy season). In 1981, the seasonal rainfall totals were slightly above normal, but the temporal distribution resulted in agricultural drought. In 1982, the rainfall totals were below normal, but the temporal distribution of precipitation was conducive to crop development. Agricultural impacts were less adverse. These four 'drought' years were followed by the most severe drought year (1983) of the previous twenty-five years, with dramatic agricultural impacts (Magalhães et al. 1988).

Droughts also differ in terms of their spatial characteristics. The areas affected by severe drought evolve gradually, and regions of maximum intensity shift from season to season. In larger countries, such as Brazil, China, India, the United States, or Australia, drought would rarely, if ever, affect the entire country. During the severe drought of the 1930s in the United States, for example, the area affected by severe drought never exceeded 65 percent of the country (see Figure 3). By contrast, drought affected more than 95 percent of the U.S. Great Plains region in 1934. In India, the droughts of this century have rarely affected more than 50 percent of the country. An exception occurred in 1918-9, when 73 percent of the country was affected (Sinha et al. 1987). On the other hand, it is indeed rare for drought not to exist in a portion of these countries in every year. For example, Figure 3 illustrates that in the United States, the percent area affected by drought is often greater than 10

Figure 3. Percent area of the United States (48 contiguous states) in severe and extreme drought (i.e., ≤ -3.0) during the period 1895-1995.



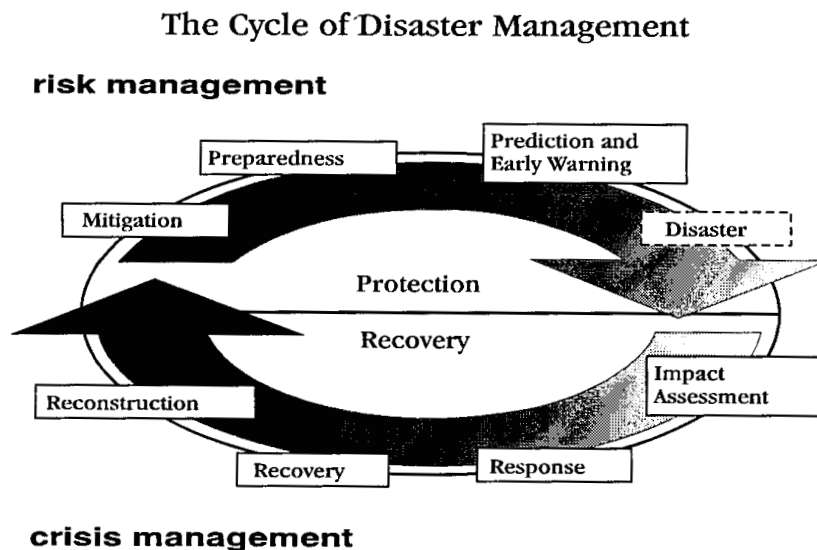
percent. Thus, the governments of these larger countries are more accustomed to dealing with water shortages and have established an infrastructure to respond, albeit reactively. For smaller countries, it is more likely that the entire country may be affected since droughts are usually regional phenomena--they result from large-scale anomalies in atmospheric circulation patterns that become established and persist for periods of months, seasons, or longer.

From a planning perspective, the spatial characteristics of drought have serious implications. Nations should know the probability that drought may simultaneously affect all or several major crop-producing regions within their borders and

develop contingencies if such an event were to occur. Likewise, it is important for governments to know the chances of a regional drought simultaneously affecting agricultural productivity in their country as well as adjacent or nearby nations on whom they are dependent for food supplies. In some instances, a nation's primary drought mitigation strategy may be to import food from nearby nations, ignoring the likelihood that a drought may have significant regional impacts on food supplies. Likewise, the occurrence of drought worldwide or in the principal grain-exporting nations, such as occurred during the ENSO event of 1982-3 (Glantz et al. 1987, Glantz et al. 1991), may significantly alter a developing country's access to food from donor governments.

Drought and the Cycle of Disaster Management

Figure 4. The cycle of disaster management.



Although drought is a natural hazard, the term drought management implies that human intervention can reduce vulnerability and impacts. To be successful in this endeavor, many disciplines must work together in tackling the complex issues associated with detecting, responding to, and preparing for the inevitability of future events. Disaster management, of which drought management is a subset, requires scientists and policy makers to focus on both the protection and recovery/rehabilitation portion of the cycle shown in Figure 4. In the past, the emphasis in disaster management has been placed largely on the response and recovery portion of this cycle, which explains why society has generally moved from disaster to disaster with little or no attention to mitigation, preparedness, and prediction and monitoring. This approach is commonly referred to as crisis management. To be successful, drought management must integrate all components of the disaster management cycle.

It is imperative that key terms included in the disaster management cycle be defined so that the reader understands each of these concepts. Definitions of these and other key terms and phrases are given below.

- **Hazard** is the potential for a major incident. To elaborate, the term refers to the probability of occurrence, within a specified period of time in a given area, of a potentially damaging natural phenomenon. Each hazard poses a level of risk that varies spatially and temporally and occurs with varying degrees of intensity and severity. Extreme natural events may affect different places singly or in combination at different times. Drought, from a meteorological perspective, is a natural event, and little can be done to reduce the frequency or severity of the event. A critical component of drought management is the characterization of the risk or exposure (i.e., drought climatology) associated with the hazard.
- **Vulnerability** refers to the characteristics of a person or group in terms of their capacity to anticipate, cope with, resist, and recover from the impact of a natural hazard. It involves a combination of factors that determine the degree to which someone's life and livelihood is put at risk by a discrete and identifiable event in nature or in society. Vulnerability exists in a continuum from high to low and can be voluntary or involuntary. Vulnerability may exist because of high exposure to the hazard, sociocultural factors, or a combination of the two.
- **Risk** is the product of hazard and vulnerability. Exposure to the natural event (i.e., hazard) is relatively constant, but vulnerability is dynamic in response to changes in societal characteristics, including technologies, policies, popula-

tion changes resulting in changes in demand, changes in social behaviour, and so forth. Activities such as mitigation, preparedness, monitoring/early warning, and prediction are all directed at reducing the risk associated with future drought events either through a better understanding of the hazard or a reduction in vulnerability, or both.

- **Disaster** is the actual historical event. Disasters can be the result of natural or environmental causes and can be human-induced. Greater emphasis on prediction, monitoring, mitigation, and preparedness can greatly reduce the frequency and severity of natural disasters.
- **Impact assessment** refers to actions that allow for early estimates of the costs and losses associated with the occurrence of drought. Impacts are generally classified as economic, social, and environmental and are difficult to quantify because of their nonstructural nature. Methodologies or techniques for estimating impacts, and the reliability of those estimates, are highly variable from one natural hazard to another.
- **Response** refers to post-impact interventions by government and others that are usually implemented during or following an emergency and directed at saving lives, minimizing property damage, or improving or shortening the post-disaster recovery process. For drought, most response efforts are in the form of emergency assistance programs or low-interest loans. Response to previous drought events is discussed in many of the case studies presented in this volume.
- **Recovery and rehabilitation** are actions or activities that restore critical life-support systems or return life to normal for persons in the affected area, such as transportation and communication services, emergency medical care, temporary housing, and water supplies. Many response, rehabilitation, and mitigation programs are directed at reducing impacts and minimizing recovery time.
- **Mitigation** is short- and long-term actions, programs, or policies implemented during and in advance of drought that reduce the degree of risk to human life, property, and productive capacity. It was noted when reading these country reports that mitigation is more frequently associated with short-term actions in many African countries. Mitigation actions are most effective if done in advance of the event. The types or forms of mitigation activities vary from one natural hazard to another. Drought-related mitigation actions are, for the most part, different from those used for other natural hazards because of the insidious nature of hazard. A first step in mitigation is the identification of the impacts associated with previous droughts and an assessment of whether these impacts (and others) will likely be associated with future drought events. From

this point, specific actions can be identified to reduce the impacts of future drought events.

- **Preparedness** refers to predisaster activities designed to increase the level of readiness or improve operational and institutional capabilities for responding to an emergency (e.g., early warning systems, operational plans). For drought, contingency plans are useful for denoting programmatic responsibilities; improving information flow on severity, impacts, and policies between and within levels of government; and coordination between levels of government.
- **Prediction** refers to activities that provide users and decision/policy makers with advanced forecasts of the occurrence of drought. These forecasts can take many forms, but probability of occurrence (time, duration, and intensity or severity) is usually associated with the predictions. Forecast accuracy is highly variable between natural hazards and is particularly limited for droughts in most parts of the world. Lead time is an important consideration for drought forecasts as well, so decision makers are given ample opportunity to incorporate this information in planning strategies and the implementation of mitigation programs. There is also an important distinction between forecasts of meteorological drought and those of hydro-

logical drought, especially in regions where snowpack is a critical element of the hydrological system. Information on the status of snowpack conditions can provide considerable advanced lead time for reliable forecasts of below-normal streamflow and reservoir levels.

- **Monitoring and early warning** refers to activities that provide information that can be used to alert decision makers at all levels of the onset of drought. This information can be used by planners, emergency managers, policy and decision makers, and others to implement programs and policies that will help to reduce the risk associated with the hazard. Monitoring activities include the collection and analysis of data, data product development, and the communication of data products to decision makers and other users. Data includes not only physical data related to hazards but also social and biological data that assist in the definition of vulnerability. A comprehensive drought monitoring system would include the collection of climatological data (e.g., temperature and precipitation) as well as streamflow, reservoir and groundwater levels, soil moisture, snowpack, and remotely sensed data from satellites. This information is useful in forecasts of agricultural and hydrological drought.

SUMMARY

Drought is an insidious natural hazard that is a normal part of the climate of virtually all regions and is particularly associated with most of the Sub-Saharan African countries. It should not be viewed as merely a physical phenomenon. Rather, drought is the result of an interplay between a natural event and the demand placed on water supply by human-use systems. Drought should be considered relative to some long-term average condition of balance between precipitation and evapotranspiration.

Many definitions of drought exist; it is unrealistic to expect a universal definition to be derived. Drought can be grouped by type of disciplinary perspective as follows: meteorological, hydrological, agricultural, and socioeconomic. Each discipline incorporates different physical, biological, and/or socioeconomic factors in its definition. It must be accepted that the importance of drought lies in its impacts. Thus definitions should be impact or application specific and reflect unique regional climatic characteristics in order to be used in an operational mode by decision makers.

The three characteristics that differentiate one drought from another are intensity, duration, and spatial extent. Intensity refers to the degree of precipitation shortfall and/or the severity of impacts associated with the departure. Intensity is closely linked to the duration of the event. Droughts normal-

ly take two to three months to become established but may then persist for months or years, although the intensity and spatial character of the event will change from month to month or season to season.

The impacts of drought are diverse and generally classified as economic, social, and environmental. Impacts ripple through the economy and may linger for years after the termination of the drought episode. Impacts are often referred to as direct or indirect. Because of the large number of groups and economic sectors affected by drought, the non-structural nature of its impacts, its spatial extent, and the difficulties in quantifying environmental damages and personal hardships, the precise calculation of the financial costs of drought is difficult. Drought years frequently occur in clusters, and thus the costs of drought are not evenly distributed between years. It appears that societal vulnerability to drought is escalating, and at a significant rate.

It is imperative that increased emphasis be placed on mitigation, preparedness, and prediction and early warning if society is to reduce the economic and environmental damages associated with drought and its personal hardships. This will require interdisciplinary cooperation and a collaborative effort with policy makers at all levels.



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INTRODUCTION

The country-based assessments of the status of drought preparedness in Sub-Saharan Africa suggest that all countries included in this sample recognize the significant impacts associated with drought, its affect on development, and the need to develop greater capacity to prepare for, cope with, and recover from future episodes of drought. Although drought preparedness levels differ considerably from country to country, progress has been made in most cases in recent years. It is apparent, however, that much remains to be done in all cases to transition from crisis to risk management for this insidious natural hazard and that many impediments exist for these countries to accomplish this task. Also required are technical, financial, and human resources from

international organizations, NGOs, and donor governments for this transition process to be successful. It is imperative that countries with considerable experience in drought management and preparedness assist Sub-Saharan African countries with this effort.

The purpose of this chapter is to synthesize the information presented in the previous country reports into a summary of the status of drought preparedness in the region. Each of the authors of the country assessment reports were given a comprehensive outline of the topics that should be addressed in their reports. Thus, while these reports differ in their organization and level of detail, they are quite similar in the topics discussed.

COUNTRY-BASED OVERVIEWS

After reviewing each of the country reports, the material was summarized into a table format which captures the main characteristics of each country with reference to three main issues: recent trends, status, and institutional capacity in drought management (Table 1); constraints to drought policy and plan development (Table 2); and future drought policy and planning needs (Table 3).

In each table, countries are arranged in alphabetical order. Since each table contains a significant amount of detail for each country, further detailed discussion of these points in this section would be redundant. The discussion that follows is intended only to highlight some of the key points extracted from the various country reports and included in Tables 1-3. This discussion will be a synopsis of the current institutional structure for drought management and preparedness, constraints to drought policy development, and some thoughts or recommendations for future consideration in the development of drought management and planning. This summary represents the thoughts of the authors of each report. If more detail or clarification of points made in this discussion or in the tables is required, the reader should refer to the appropriate country report.

Angola

No drought plans currently exists in Angola and, therefore, there is no coordination of actions associated with drought. Vulnerable regions and sectors have been identified; malnutrition continues to be a critical problem in areas most affected by drought. A National Forum on Drought and

Desertification was held in 1990 in response to drought conditions. The results of this meeting could form the policy base for drought actions but the recommendations from this meeting have not been implemented.

Much of the country's infrastructure was destroyed as a result of civil war and military barriers restrict movement of people and land mines make farming difficult. No early warning system exists and the lack of meteorological and hydrological data and a poor information dissemination system is a critical problem. The National Rapid Alert System needs to be reestablished and greater assistance is needed from the World Meteorological Organization, regional programs, and sister organizations in SADC countries. These deficiencies make it difficult to develop an adequate drought policy and plan.

The following recommendations were made by an Inter-sectoral Mission of the Ministry of Agriculture and the Ministry of Energy and Petroleum: (1) a regional emergency sub-committee should be formed; (2) drought programs should be a part of the country's development program; (3) extension visits to other countries with drought problems would be beneficial to Angola's effort to develop a drought plan; and (4) a reconstruction program for southern Angola is needed to combat drought. A Commission on Drought and Natural Disasters was created under the Ministries of Agriculture and Rural Development with the purpose of monitoring, evaluating, and proposing timely measures to minimize impacts. Apparently, this Commission has not been active in

addressing drought preparedness issues. A national weather/climate information network is greatly needed.

Botswana

Botswana has had a long-standing history with drought programs, dating back to the 1960s. No single drought policy/plan document exists but drought policy has been addressed/defined in several national development plans. Reports, both internal and external, have documented experiences with drought and have provided the basis for necessary improvements. Drought planning is a part of development planning and institutional structure is well defined, with local involvement at the district level. Primary authority for drought management is with the Ministries of Finance and Development Planning, Agriculture, Health, and Local Government Lands and Housing, Mineral Resources and Water Affairs, Works Transport and Communications (Meteorological Services), and Commerce and Industry. Government relief is directed mainly to protection of human life, protection of key assets, and facilitation of recovery and rehabilitation. Progress on drought mitigation has been made through economic development and diversification and the ability of the government to import food. Improved road networks have enabled government to distribute food during times of need. An Early Warning Technical Committee is composed of many groups which meet regularly.

Greater attention needs to be directed at assessments of household vulnerability. To achieve this goal, greater understanding of how drought impacts individual households is needed. These factors should be incorporated into the current early warning system. Greater involvement of communities would help with this local level evaluation. District drought committees need to become more involved to improve future drought mitigation and response efforts.

Indices need to be reviewed and modified as necessary to fit changes in operational guidelines. Actions taken in response to drought need to be revised under conditions of regional drought. Current actions are directed more at local drought conditions. Existing programs, strategies, and policies need to be consolidated under a single policy document to better incorporate issues of mitigation, preparedness, emergency response, and rehabilitation.

Lesotho

A Disaster Management Authority currently exists and makes forecasts of cereal production because food insecurity is the most important impact of drought. Meteorological Services monitors drought intensity and issues warnings in cooperation with the Disaster Management Authority, Rangelands

Division, and the Water Affairs Department. There is widespread recognition of severe environmental degradation in the country but despite the existence of the National Environment Action Plan, little has been accomplished. The goal of the National Development Plan is to reduce poverty through integration of sustainable development and economic integration. Vulnerable population groups are protected by safety nets such as strategic food reserves, special employment schemes, and feeding programs for children. A food for work program exists, as well as a free seed and fertilizer program for small farmers. NGOs are actively involved in Lesotho in the areas of water, food security, health, and sanitation; these actions are coordinated by the Council for Non-Governmental Organizations.

Low levels of environmental awareness, despite serious problems of soil erosion, air and water pollution, and desertification, is a serious constraint to drought preparedness. The country's poverty level is high because of high unemployment. Lack of trained manpower contributes to the lack of progress on drought management.

A National Disaster Management Plan was adopted in 1996 and is under the leadership of the Disaster Management Authority. The plan's primary objective is to improve national capacity for disaster mitigation, preparedness, response, and recovery. The plan's scope includes drought and other natural disasters but no specific drought mitigation and preparedness policy currently exists because drought is not considered to be of economic concern in the country. The role of NGOs is not specifically defined in the plan. A National Disaster Relief Task Force functions under this plan and provides leadership during disasters. The task force provides early warning and public awareness and training in disaster relief. A National Early Warning Unit is supported by FAO and includes many units.

Malawi

The entire country has been identified as vulnerable to drought. Two early warning systems exist, a National Early Warning System and a Famine Early Warning System, the latter is funded by USAID. The National Economic Council contains the Food Security and Nutrition Unit which coordinates drought management projects between the various ministries. A Food Security and Nutrition Bulletin provides regular updates of potential food deficits. A Natural Disaster Preparedness Committee is responsible for advising on policy issues related to disaster mitigation. The Committee was formed in 1991 by the Disaster and Relief Act. District and regional level committees exist and provide information at the national level. A National Disaster Preparedness, Relief and Rehabilitation Committee maintains strategic food

reserves, introduces irrigation schemes, and improves credit opportunities for small farmers.

A National Disaster Management Plan, which includes drought, was drafted in 1996 by consultants from the University of Malawi. This plan is directed at the development of greater institutional capacity to deal with drought and other disasters, a primary constraint to improved disaster management in the country. Presently, management efforts during drought are directed mainly at providing food for those most at risk and, as a result, cannot focus on longer term issues of improved preparedness and mitigation. Greater funding is needed to address these issues.

A deficiency of the National Disaster Management Plan is the lack of emphasis on longer term issues of mitigation and preparedness. The plan outlines specific food security measures that need to be implemented for drought and other specific measures such as drought insurance schemes, improved drought monitoring, and development of strategic reserves of seed for primary pulses and cereals. Proposed changes in drought management and mitigation actions have been submitted through the National Economic Council. These changes emphasize short-, medium-, and long-term actions. A wide range of actions are identified in Table 3.

Mauritius

No drought policy currently exists in Mauritius but drought-related policy issues are included under policies for the water sector. The objectives of the water policy is to achieve satisfactory water supply for all water sectors, conserve water, preserve and protect surface and ground water quality, ensure rational allocation of water resources compatible with development priorities, and expand water in storage to meet projected demands for sugar cane production. Water resource needs through 2040 have been assessed by the Water Resource Unit of the Ministry of Public Utilities.

A National Committee on Cyclones and Natural Disasters currently exists and drought and other natural disasters are monitored through their efforts. Greatest attention is given to cyclones but the Committee also considers issues related to drought, although these are mainly of a response nature. A Drought Action Plan has been prepared and is reviewed annually by water authorities. Greatest attention is given to potable water supplies with secondary emphasis on industrial and agricultural water. A National Water Resource Management Committee has been established to assess medium and long-term water needs for economic sectors. Greater involvement of NGOs in reducing the effects of drought would be beneficial.

The National Development Plan will incorporate greater reservoir storage and improved efficiency of irrigation pipelines. Research is also being directed to new varieties of sugar and other crops that are better adapted to dry conditions.

Mozambique

The Department for the Prevention and Combatting of Natural Disasters was developed in 1980 to address the impacts associated with natural disasters and their effects on development goals. This department provides humanitarian assistance during drought and is also responsible for policy decisions. The National Institute of Meteorology is responsible for disseminating weather information to farmers. A Famine Early Warning System is funded by USAID and monitors agricultural and weather conditions and provides information to farmers. The Ministry of Agriculture and Fisheries makes annual estimates of total agricultural production and coordinates the National Early Warning System. This is comprised of the Harvest Prediction and Culture Monitoring Unit, Food Security Unit, and Nutrition Unit in the Ministry of Health. An Inter-Sectoral Group for Analysis of Mapping of Vulnerable Areas and Sectors has been given the task of vulnerability mapping.

The low quality of information available to decision makers has negatively affected the decision making process in the country. Training of technicians is deficient because of the shortage of funds, which limits the application of mitigation measures for drought and other natural disasters. Poor road conditions hampers the distribution of food to deficit areas. An action plan is currently being developed by the Inter-Sectoral Group for assessing vulnerable areas. Increasing water in storage through the construction of dams is a priority for the water sector. A strategy is being developed for implementing seasonal forecasts in association with El Niño events. A national food security stock is being proposed with assistance from international donors.

Namibia

No institutional capacity existed in Namibia at the time of independence. In 1989, the National Drought Relief Committee was established with the goal of developing a strategy for food distribution during times of drought. Response efforts have relied largely on churches. Drought continues to be viewed in an emergency context, with drought relief programs in the livestock, crop, health, and water sectors. Although drought occurs frequently, it has not been addressed as part of development planning. Response shortcomings to previous droughts have been in the following areas. First, drought declarations are not based on scientific criteria because definitions are inadequate. Second, relief programs have discouraged farmers from adopting



risk-minimization farming practices. Third, relief programs have led to the development of unsustainable farming practices. Fourth, household food security has not been improved because food distribution has been inefficient and poorly targeted.

Many constraints were identified as leading to current drought-related problems and lack of progress in drought preparedness in Namibia. At the root of the drought problem in Namibia is the level of poverty which exists and can be explained largely by inequities in access to land. Northern communal farmers are particularly at risk to drought because they are not integrated into the national market. These farmers need better access to credit and veterinary services, as well as small irrigation schemes which are directed at producing high-value crops. An improved network of road would facilitate regional development and access to goods and services. Three marketing boards currently monopolize external trade and need to be eliminated to improve efficiency and equity. Better extension services are needed to educate farmers.

A national drought policy was recently prepared by the Ministry of Agriculture, Water, and Rural Development. This policy is aimed at developing an efficient, equitable, and sustainable approach to drought management. The goal of the policy is to shift responsibility for the management of drought risk from the government to the farmer. There are eight tenets of this policy which are identified in Table 3. A National Emergency Management System will develop institutional capacity and integrate this effort between national, local, and community levels of government. An Emergency Management Unit is responsible for monitoring and evaluating drought conditions and training personnel from government agencies and NGOs. Food security will be monitored by the early warning system of the Ministry of Agriculture, Water, and Rural Development.

South Africa

A National Consultative Drought Forum was established in 1992 and is made up of representatives of government, church organizations, trade unions, and NGOs. The Forum has led to a shift from an exclusive emphasis on commercial farmers to a more comprehensive program that includes rural farmers, rural poor, and farm workers. Policy changes included greater equity for recipients of assistance. Drought policies have increasingly focused on improving levels of self reliance and reducing risk in the agricultural sector and stabilizing farm income. A National Disaster Management Committee was established in 1995 with similar structures at the provincial and local levels of government. The primary objectives of this Committee are to develop national disaster

management policy, propose and review new legislation, promote community participation in disaster management, promote the establishment of an integrated disaster information system, and ensure risk reduction at the national level. Much progress has been made since 1995 in achieving these objectives. Progress is also being made on the development of a comprehensive early warning system.

Despite considerable progress in drought preparedness, there are constraints to continued improvements. Coordination between departments with drought management responsibility is necessary and more emphasis on mitigation is necessary. Post-drought audits have not been routinely completed and should be for continued improvements in policies and programs. More information is needed on vulnerable population groups and sectors and NGOs and the private sector must be engaged. Each of these tasks are complicated by the significant government reorganization currently taking place in South Africa.

Current drought policy initiatives must continue to be addressed. The comprehensive early warning system must become more interdisciplinary by incorporating all relevant departments and field-based personnel. A vulnerability tracking system is needed that is coupled to the early warning system.

Swaziland

A drought policy is not in place in Swaziland. A national drought workshop was held in 1994 to review management strategies, identify and examine linkages among institutions, develop national strategies to enhance coping capacity, and develop linkages to local communities and regional and national institutions involved in drought management. A comprehensive plan was developed which defines responsibilities and terms of reference for institutions involved in drought management and procedures for drought declaration. Eight strategies and ten policy guidelines were proposed and are awaiting government approval. Three drought-related early warning systems exist in Swaziland.

A national forum on desertification was held in 1997 and is expected to lead to a national program to address issues of environmental degradation. The country has been divided into agro-ecological zones which identify the most vulnerable drought regions. A consortium of NGOs has been identified to address the needs of vulnerable population groups.

Currently, there is no legislation or institutional arrangements to guide drought management in Swaziland. There has traditionally been too much reliance on donors because of the lack of financial resources available within the country.

Recommendations emanating from the national drought workshop in 1994 are comprehensive and, if adopted, would provide for considerable institutional structure to address drought-related issues. The National Drought Task Force is under the leadership of the Depute Prime Minister's office.

Zambia

A drought preparedness/management plan was implemented during the 1980s but was eliminated in 1991 just prior to the 1991/1992 drought. This focus of the plan was to coordinate and mobilize funding for disaster relief. This program was replaced with the Program for the Prevention of Malnutrition and the Program Against Malnutrition. These programs are aimed at reducing poverty through improved food security, health, and nutrition. Key strategies are networking of government, NGOs, and donors to optimize human and financial resources, community empowerment in decision making to foster sustainable development activities, and training of stakeholders in program and program management, nutritional issues, environmental management, and disaster management and mitigation. The Program Against Malnutrition is trying to build capacities of NGOs to empower communities on issues such as disaster management and mitigation and food security through training programs. This program is operated by a NGO and provides agricultural inputs such as fertilizer and drought-tolerant seeds. Components of the current plan include drought preparedness, response, and recovery/rehabilitation under the responsibility of the National Disaster Relief Committee, with representation at both the provincial and district levels.

Strategies employed to cope with drought have had a negative impact on the environment. The resource base of Zambian farmers has been eroded in recent years by persistent droughts. Lack of adequate financial resources are a major constraint to drought preparedness.

The policy on disaster management has not yet been finalized by Parliament. The drought policy needs to focus more on shifting farmers to drought-tolerant varieties, crop diversification, and providing an information system to deliver information on weather patterns, input and produce market information, and storage information. An Agricultural Sector Investment Program is focussing on sustained agricultural and economic growth. The principal tenets of this program are a cost-effective irrigation system, comprehensive research program aimed at producing crop varieties and animal breeds adaptable to drought conditions, crop diversification program aimed at enhancing food security and nutritional status, and a Rural Investment Fund for infrastructure projects aimed at enhancing food security and nutritional status.

Zimbabwe

A Cabinet Committee on Drought recently replaced the National Civil Protection Coordination Committee that had been charged with responding to national disasters for two decades. The new committee is chaired by the Minister of Public Service. This committee is linked to the National Consultative Drought Council made up of donors, NGOs, church organizations, and the private sector. The current infrastructure for drought was reviewed at stakeholder workshops and the following conclusions were drawn: (1) too many committees and subcommittees are involved in drought management; (2) information flow is largely one-way (upwards) and there was not effective flow of information with the Council; (3) too many players in implementing relief programs resulted in duplication of efforts; (4) slow response of relief programs because the Ministry of Finance has not been involved; and (5) regional coordination through SADC holds considerable potential in responding to future droughts.

The Grain Marketing Board has hindered private trade and informal markets in the past and has now been removed. This board was a disincentive to producers, traders, and consumers.

Institutional development, insurance schemes and stabilization activities, short- and long- term drought mitigation programs, national guidelines on nutritional requirements for households and monitoring food standards are needed to improve drought preparedness. Distribution warehouses should be constructed by the government to get inputs to farmers in a timely manner. The meteorological network needs to be upgraded with more reliable instruments and expanded coverage to help with the development early warning system. Donor assistance needs to be better coordinated with minimal interference by the government. Drought mitigation programs need to focus on long-term water resources development, especially for small farmers since large-scale farmers often have irrigation facilities available. Food storage facilities need to be enhanced and more research conducted on storage technology. Farmers need to be better educated on storage management. Improve road networks would greatly improve distribution of food from areas of surplus to deficit areas. The need for food imports could be reduced dramatically with the establishment of a strategic grain reserve.

Table 1.
Recent Trends, Status,
and Institutional Capacity
in Drought Management

Angola

No short or medium term plans exist to deal with the occurrence of drought. Drought emergency measures taken in response to drought in 1989/90 have not been documented and are mostly forgotten.

No consensus on a definition of drought.

National Forum on Drought and Desertification and inter-sectoral evaluation missions created by Ministries of Agriculture and Rural Development (MINADER) in southern Angola in 1990 in response to drought. The results of this meeting provide the policy base for drought actions but no progress has been made in implementing these recommendations.

Vulnerability to drought is highest in provinces of Kunene, Huila, Namibe, and Benguela.

Most vulnerable sectors include dryland and irrigated agriculture, livestock raising and herding, water supply for people and animals, and energy (hydroelectric).

Incidence of malnutrition is high in many areas affected by drought.

Special program of Assistance to Angola drawn up in 1990 by the UN in response to an appeal from the country for help in alleviating a potential famine. This plan described an operational framework to provide humanitarian assistance to people in the 9 provinces affected by famine because of drought and war. Surveys

of populations at risk were conducted as a result of this program.

No single government body is responsible for coordination of actions in associated with drought. A Technical Unit for Assistance during the 1990 emergency was formed was brought together experts from the MINADER and the Ministry of Energy and Petroleum. This unit has not been very productive. A Technical Unit for Aid Coordination was formed by the Council of Ministers in 1990 and is the most active government entity. Its primary responsibility is the receipt of all food and non-food aid provided to the country.

Commission for the Drought and other Natural Disasters was created under MINADER with a mandate to monitor, evaluate, and propose timely measures to minimize the effects of droughts and other natural disasters.

Botswana

Drought relief program adopted by government in 1980. This program included a set of indices for rainfall, harvests, and nutrition. This system has been modified in subsequent years. Governments relief program actually date back to droughts that occurred in the 1960s. Current plan cannot be traced to a single policy document but relate to several policy positions provided in national development plans. Numerous reports on drought management have been prepared, beginning with the 1977 report by Sandford and most recently a government paper published in 1991. These external and internal reports provide much information and document a great deal of experience with drought management in the country.

Current government strategy is to incorporate drought management into the regular planning processes. This implies that non-emergency aspects of drought would be an integral part of regular development programs. It also implies that the government will use existing development projects and programs to respond to drought.

Institutional structure for drought management is made up of the Rural Development Council, Inter-Ministerial Drought Committee, and the Early Warning Technical Committee at the national level. District Drought Committees exist at the local level.

Authority for drought management resides with the Ministries of Finance and Development Planning, Agriculture, Health and Local Government Lands and Housing, Mineral Resources and Water Affairs, Works Transport and Communications (Meteorological Services) and Commerce and Industry.

New labor-based programs to increase job opportunities were adopted in 1991 and is a central tenet of the new approach to drought management. There was little adoption of this approach in response to the drought of the 1990s. Implementation of these programs is the responsibility of the District Councils.

Standby program of relief intervention which is based on projects and programs contained in the National Development Plan. This includes a feeding program covering primary school children and medically-selected vulnerable groups and a program to provide relief to destitutes. These programs are expanded during drought.

Current drought relief programs are

directed toward human relief (feeding program, labor-based public works program, and human water supply program), livestock relief (free vaccinations, livestock water supply program, provision of livestock feeds), and arable assistance packages (free seed and plowing and planting grants). Shortages in cereals sometimes leads to a release of grain from the strategic grain reserve.

Early warning system is overseen by an Early Warning Technical committee, a subcommittee of the Inter-Ministerial Drought Committee. Many groups are part of this system and contribute information. System constructed around existing departmental information systems to ensure the long term sustainability of the system. Information is reviewed on a monthly basis by the Early Warning Technical Committee and submitted to the Inter-Ministerial Committee for further action. A Drought Assessment Tour at the district level occurs annually to validate information from the field. District drought committees also exist but these are active only during droughts.

Government relief mainly directed to the protection of human life preservation, protection of key assets, and facilitation of recovery and rehabilitation. Drought mitigation is understood to be programs, strategies, and actions taken in advance to reduce vulnerability of society, wildlife, and natural systems. Progress has been made in reducing vulnerability through economic progress and through the ability of the government to import food. The government also has a greater ability to organize food distribution, partly because of an improved road network. The institutional capacity of the country has improved and provide an improved ability to mitigate drought impacts.

Mitigation strategy for the country is focussing on economic diversification, improving the supply of commodities such as water, food, and pasture, development actions aimed at reducing poverty, inefficient markets, lack of infrastructure, physical and economic isolation, and economic mismanagement. Botswana has demonstrated an ability to cope with drought because of the efficiency of domestic markets which is facilitated by the presence of regional and domestic infrastructure and well distributed food retail outlets in remote areas.

Lesotho

Lesotho Meteorological Services monitors drought intensity and issues warnings in collaboration with the Disaster Management Authority, Rangelands Division, and Water Affairs Department. Disaster Management Authority makes forecasts of cereal production since food insecurity is the most important impact of drought.

National Environment Action Plan formulated in 1989 to integrate environmental issues in social and economic development. This was done in recognition of conditions of severe environmental degradation in the country. This was not implemented at the time. The National Environment Secretariat was created in 1994 to develop and coordinate an integrated program in environmental planning and management.

National Development Plan exists to emphasize themes of sustainable development and economic integration. The goal is to reduce poverty in the country.

Vulnerable population groups are protected only by the following safety nets: strategic food reserves; special

employment schemes; and feeding programs for malnourished children under 5 years of age.

Response programs include free food distribution, food for work program, free seed and fertilizer for small farmers, strategic grain reserves for price stabilization, and NGO interventions for food security, water, health, and sanitation. Council for Non-Governmental Organizations coordinates NGO activities.

Malawi

Food Security and Nutrition Bulletin produced which provides forecasts of potential food deficits.

National Disaster Management Plan drafted in 1996. This plan identified the entire country as vulnerable to drought, especially the lower Shire and Rumphi West areas. The plan was prepared by consultants from the University of Malawi and attempts to identify procedures for responding to emergencies and developing a greater institutional coping capacity for drought and other disasters.

Mauritius

Insurance scheme established to protect sugar cane producers from severe losses associated with cyclones and is managed by the Sugar Insurance Fund Board. This scheme has been extended to other natural disasters, including those resulting from drought.

No drought policy exists but drought-related policy issues are considered under the water sector policy. The objectives of that policy are to achieve satisfactory water supply for all economic sectors, conserve water, preserve and protect the quality of surface and ground water resources, ensure rational allocation of water

resources compatible with development priorities, and increase water in storage for sugar cane production to meet projected demand.

Programs in progress include improving water distribution systems to reduce losses, water rights revisions, optimal use of ground water, improved research and extension options on the development and adoption of more water efficient systems, reduced pollution of surface and ground water resources, and rationalization of water tariffs.

Water Resource Unit recently set up within Ministry of Public Utilities to monitor water allocations, working with the Central Water Authority. The WRU has been assessing water resource needs, projected to 2040.

National Committee on Cyclones and Natural Disasters exists with membership from various ministries. A sub-committee monitors impacts of drought and other natural disasters. The NCCND mainly focuses on cyclones, directing efforts to establish preventive measures for reduce losses to building and farm produce and make decisions on relief and rehabilitation following disasters. This Committee also considers issues related to drought planning and preparedness, although the emphasis is more on response measures.

Drought Action Plan has been prepared and is reviewed annually by water authorities. A national committee exists to monitor the water situation with the greatest attention being given to potable water supplies. Water priorities during drought are potable water, industrial water, and agriculture. Monitoring begins in October, the beginning of the most drought-prone

season. Regular meetings are held with farmers by the Irrigation Authority and the Extension Service.

National Water Resource Management Committee set up to assess medium and long term water needs for sectors of the economy.

Mozambique

Department for the Prevention and Combatting of Natural Disasters (DPCND) was developed in 1980 in recognition of the impact of these events on development plans. Other institutional capabilities exist with the National Institute of Meteorology, Inter-sectoral Group for the Analysis Mapping of Vulnerable Areas and Sectors, National Early Warning System, and Famine Early Warning System.

Ministry of Agriculture and Fisheries (MAP) makes an annual estimate of the total agricultural production.

National Institute of Meteorology (INAM) is responsible for weather forecasting in the country. INAM organizes briefings, workshops, and disseminates this information to farmers and others. They currently do not have the capability to make seasonal weather predictions.

Inter-Sectoral Group for Analysis of Mapping of Vulnerable Areas and Sectors is in charge of vulnerability mapping. They conduct technical meetings with primary agencies which exchange information on susceptible areas of the country. These meetings have resulted in an agreement between institutions to collaborate.

Department for the Prevention and Combat of Natural Disaster (DPCCN) has responsibility for providing humanitarian assistance during

drought. DPCCN is also responsible for policy decisions relating to the disaster.

National Early Warning System (SNAP) is coordinated by the early warning unit from MAP. Three institutions comprise SNAP: Harvest Prediction and Culture Monitoring Unit under the auspices of MAP; Food Security Unit; and Nutrition Unit in the Ministry of Health.

Famine Early Warning System, funded by USAID, has been implemented to monitor agricultural and weather conditions and verify agricultural conditions. This system provides early warning to farmers on the timing of planting and measures that can be taken given the forecast information.

Medicines without Borders collects information from NGOs and others on issues of food security and nutritional health.

World Food Program provided food during the recent drought. World Bank is also involved in the country in providing credit concessions and has projects in the agricultural sector related to research and extension.

Namibia

The Republic of Namibia inherited no institutional capacity to deal with drought at the time of independence. A National Drought Relief Committee (NDRC) was established in 1989 and developed a strategy for food distribution. The NDRC relied heavily on churches to assist in this effort.

Drought is viewed in the context of emergency response. Drought has not been addressed as a part of development planning, although it is a frequent feature of the landscape. Funds allocated to drought have been used

to establish a drought relief program in the livestock, crop, health, and water sectors.

Past drought response efforts have experienced the following shortcomings:

- (1) no adequate definition of drought so that declarations are not based on scientific criteria;
- (2) government relief programs have discouraged farmers from adopting risk-minimizing farming practices;
- (3) drought programs have led to unsustainable farming practices; and (4) food distribution to vulnerable population groups has been inefficient, poorly targeted, and of limited impact in creating household food security.

South Africa

National Consultative Drought Forum was formed in 1992 and made up of representatives of government, church organizations, trade unions, and NGOs. Led to shift in focus from exclusively commercial farmers to a program that also included rural farmers, rural poor, and farm workers. Included vision for long-term planning, nutritional surveillance, and a comprehensive early warning system. Policy changes included greater equity among beneficiaries of assistance.

Establishment of National Disaster Management Committee (NDMC) in 1995 with similar structures at provincial and local levels of government. Functions of NDMC include development of national disaster management policy, propose and review new legislation, establish an effective disaster management structure focussing on pre-disaster risk reduction, promote community participation in disaster management, promote establishment of integrated disaster information system, and ensure risk reduction at the

national level. This initiative has not made substantial progress in achieving its goals.

Recent recommendation by Cabinet Committee to approve an Inter-Ministerial Committee for Disaster Management, create a Disaster Management Centre, and a Green Paper on Disaster Management.

Created a Community Drought Mitigation Program to reduce community vulnerability to drought. This activity extends into several countries in Southern Africa.

Drought policies for commercial and small-scale farmers are increasingly being designed to encourage self-reliance and improve methods of dealing with risk in agriculture, with the goal of stabilizing farm income.

Progress is being made for a more comprehensive early warning system. Improved weather networks and the creation of a long-lead forecasting forum and an information service have been developed. More information on soil moisture, crop forecasts, area assessment, etc. are needed. More progress on a comprehensive, interdisciplinary early warning system is necessary.

Swaziland

National Forum on Desertification held in 1997 to address issues of environmental degradation. This is expected to lead to a national program to combat desertification.

Country has been divided into agro-ecological zones which helps to identify the most vulnerable areas to drought. Lowveld is the most vulnerable area. More specific areas vulnerable to drought have also been

identified. Drought relief is directed towards these areas. Economic sectors most affected by drought are agriculture and manufacturing. Most vulnerable population groups have also been identified. Consortium of NGOs has been formed to address the needs of these vulnerable population groups.

Tanzania

Government has invested in Economic Recovery Programs to mitigate the effects of poverty.

Socio-economic drought impacts are most significant on agriculture, including livestock, wildlife, industry and energy production, and social sectors. Social impacts include health, nutritional status, and water supply. Impacts on the environmental sector are also important, including land degradation processes associated with overgrazing, inappropriate farming practices, and lack of environmental conservation practices.

Disaster Relief Coordination Department was established in 1990 to create a system to anticipate, coordinate, and control disasters, including the organization of relief measures. The DRCD has responsibility to coordinate relief operations and preparedness measures under the Tanzania Disaster Relief Committee, conduct research relevant to its functions for the purpose of advising the Disaster Relief Committee on measures necessary for disaster prevention, disseminate information, execute decisions of government, formulate and recommend the scope of disaster prevention plans, review disaster prevention measures, etc.

Food Security Department was established in 1991 and has a Crop Monitoring and Early Warning Unit (CMEWU) and Strategic Grain Reserve

(SGR) as components. General responsibilities include monitoring the food situation and making recommendations, as well as managing the SGR. Produces a Food Security Bulletin monthly during drought episodes.

Tanzania Food and Nutrition Centre is involved in food and nutrition monitoring. Supports rural surveys on nutritional status to identify problems related to food insecurity, especially in drought-prone areas. The centre links government and donor initiatives, notably UNICEF. Plans are underway to implement community-based food security and nutrition planning to reverse top-down planning.

National Disaster Task Force appointed in 1997 to strengthen government's capacity to coordinate and intervene during drought episodes. Task force responsibilities include determining the magnitude of drought-related problems, advising government on proper intervention measures to be undertaken to lessen impact on vulnerable populations, coordinate and supervise implementation of government interventions, serve as liaison to national and international food aid organizations, secure short-term and early-maturing crop varieties for drought-affected regions, monitor and assess food stock levels held by government, private traders, and households, and deal with all other drought relief operations.

Committee on Food Shortage was created recently to define a methodology for the identification of the vulnerable population in food shortage areas. Membership on this committee is broadly defined. Sub-district disaster management committees exist to ensure community participation in dealing with problems related to drought management.

Early warning system developed as a result of the 1970s drought and the Crop Monitoring and Early Warning Project was established in 1978 to coordinate this program. National Early Warning Unit is located in the Ministry of Agriculture and prepares food crop production forecasts based on information such as agrometeorological and crop conditions, soil fertility, input availability, area planted, and expected yields. This unit played an important role in the droughts of the 1990s in warning government of impending famine.

Short-term measures taken in recent years include building public awareness of drought problems and solutions. This has been effective in helping to mobilize people to address problems. Marketing information has been provided through government channels to help mobilize and facilitate private traders to participate in domestic grain marketing. Early maturity varieties have been provided to farmers in drought-affected areas.

Long-term measures have focused on economic reforms, recognizing the linkage between vulnerability and poverty, and developing programs to improve living standards for rural-based households. A National Environment Management Council has been established to address environmental issues, particularly environmental degradation. Pursuing the establishment of a household food security and nutrition monitoring system in conjunction with SADCs Regional Early Warning Unit to improve food security. Other programs in the areas of water and sanitation and nutritional education and intervention have also been initiated.

Zambia

Most vulnerability sectors to drought are agriculture, utilities (electricity,

gas, and water), and mining and manufacturing because of their reliance on electricity. Most vulnerable population group is small farmers, particularly those headed by women.

Program for the Prevention of Malnutrition is coordinated by the Office of the President. Food for work projects are directed at community projects such as school construction, health centers, roads and bridges.

Program Against Malnutrition is operated by a NGO that provides agricultural inputs such as fertilizer and drought-tolerant seeds. This program distributes seed to farmers through a revolving fund. This program has also established storage and marketing points for relief food, farm produce, seeds, and fertilizers.

Monitoring relief programs are the responsibility of a technical committee chaired by the Permanent Secretary in the Office of the Vice President.

Drought preparedness/management plan was put in place during the 1980s but was disbanded in December 1991 before the 1991/92 drought. The objectives of this plan were to coordinate drought relief operations and mobilize funding for disaster relief. This program was replaced with the Program for the Prevention of Malnutrition and the Program Against Malnutrition, under the authority of the Vice-President's office.

Current program or plan objective under the Vice President are to reduce national poverty through improved food security, health, and nutrition. The key strategies under this objective are networking of government, NGOs, and donors to optimize human and financial resources; com-

munity empowerment in decision making to foster sustainable development activities; and training of stakeholders in program and project management, nutritional issues, environmental management, and disaster management and mitigation.

Components of the plan include drought preparedness (i.e., meteorological department, early warning unit, food stocks), response (rapid government action, coordination between government and donors), and recovery/rehabilitation (short- and long-term measures). The National Disaster Relief Committee is responsible for dealing with all aspects of the plan. This committee has representation at both provincial and district levels.

Twenty-six catchments have been identified in 5 provinces that are most vulnerable to drought. Committees exist in each of these provinces as part of the Program for Prevention of Malnutrition.

At the regional level, SADC has a regional early warning system. There also exists a Food Security Technical and Administrative Unit.

National Early Warning System (NEWS) for food security was established in 1982 and is composed of multi-disciplinary institutions but is under the Ministry of Agriculture, Food and Fisheries. NEWS collects through surveys information on quantities, varieties, and prices of inputs distributed, sold, and used, crop condition, crop forecast estimates, planned imports and exports of grain and agricultural inputs, weather forecasts, and availability and disbursement of loans. Information is distributed through a monthly food security bulletin.

Post-drought evaluation conducted in 1993 following the 1991/92 drought episode through the National Workshop on Drought Management.

Program Against Malnutrition is trying to build capacities of NGOs to empower communities on issues such as disaster management and mitigation and food security through training programs.

Zimbabwe

National Civil Protection Coordination Committee has been charged with responding to national disasters for the past 20 years. In response to the drought of 1991/92, the chairmanship of this committee was moved to another Vice President. This structure was dissolved following the drought.

Cabinet Committee on Drought replaced the Committee above and is chaired by the Minister of Public Service. This Committee is linked to the National Consultative Drought Council (NCDC) made up of donors, NGOs, church organizations, and the private sector. Drought is monitored at the provincial and district levels by committees.

The current structure was reviewed at stakeholder workshops and the following conclusions were made: (1) too many committees and subcommittees are involved in drought management; (2) information flow is largely one-way (upwards) and there was not effective flow of information with the NCDC; (3) too many players involved in implementing relief programs, resulting in duplication of efforts; (4) slow response in providing funds for relief programs because the Ministry of Finance is not involved with these committees; and (5) regional coordination through SADC holds potential in responding to future droughts.

Drought workshop held in September 1997 included all major stakeholders. A preparedness paper is being compiled as a result of that workshop for use in the El Niño event that was expected to occur in 1997-98.

Implementation of a market liberalization program in agriculture and other sectors in the economy is underway. This program is critical to the development of drought policies because an understanding of markets prices, and transport behaviour is essential during droughts.

Interventions have generally occurred at the local, national, and international level. Local interventions occur at the community level by church organizations, although donations through these channels often come from overseas. National level interventions during recent droughts have included crop packs, livestock support, and a cotton input scheme. Government is trying to phase down the Crop Packs program supervised by Agritex because of concern about farmers becoming dependent. The livestock support programs have been quite successful in maintaining and rebuilding herds.

Table 2.
Constraints to Drought
Policy/Plan Development

Angola

Civil war destroyed much of the country's infrastructure and also negatively affected the marketing network. Considerable movement of rural population has compromised food production.

Lack of an early warning system and a poor network of meteorological stations. Meteorological data is not computerized. Little meteorological data is available for the most vulnerable provinces. Poor delivery of information to persons outside drought-affected areas.

Poor understanding of the ecological and environmental aspects of drought by the media.

Centralization of decision making results in local authorities having no control over resources assigned to them in the general budget.

Disorganized state of information, in particular, the Centre for Technical Dissemination of MINADER.

Inter-sectoral coordination only occurs in emergency situations.

Military barriers restrict movement of people and land mines make farming and conduct of surveys difficult.

Lack of understanding of the impacts of drought on prices, basic sanitation, drinking water supply, and water supply is not available.

Botswana

Household vulnerability assessments need to be strengthened. More infor-

mation is needed on household livelihoods and how drought impacts on these livelihoods. Early warning systems need to incorporate more parameters which show local conditions.

Communities need to become more involved in monitoring drought at the local level.

District Drought Relief Committees need to become more active and routinely gather and review early warning information and distribute this information to others.

Lesotho

Country is characterized by serious environmental degradation problems such as soil erosion, loss of agricultural land, desertification, and air and water pollution. Low levels of environmental awareness exists.

Increasing poverty levels because of high unemployment and the shortage of trained manpower.

Malawi

Primary constraint is the lack of institutional capacity, including human resources, to cope with drought and other disasters. They are preoccupied with finding food to deal with the current crisis and cannot focus on looking at longer term issues. Funding to follow through on proposed planning and mitigation actions is lacking from the government. Funding is also sought through SADC.

Mauritius

NGOs have not been active in Mauritius in reducing the effects of drought.

Mozambique

Quality of information available to decision makers is low which interferes with the decision making process.

Lack of funds to train technicians and implement projects directed at reducing the impacts of drought through preventative or mitigative actions.

Transportation of food to areas of deficit is difficult because of the poor condition of roads.

Namibia

Poverty is at the root of many of the drought-related problems facing Namibians. Northern communal farmers must be integrated into the national market by providing credit extension and veterinary services. Inequity in access to land is a fundamental cause of rural poverty.

Improvement of the road network in the north to improve the transportation of goods and services. More feeder roads would accelerate the development of regions.

Deregulation of the transport sector and a change to high-value crops would have a beneficial impact on the status of poor farmers.

Three statutory marketing boards monopolize external trade. This structure must be eliminated to improve efficiency and equity.

Reduction of transport costs is necessary to lower producer costs and consumer prices.

Establishment of formal credit markets in communal areas.

Improve farmer education and technical support through more research and better extension services.

Development of small-scale irrigation schemes in the north to produce high-value crops.

South Africa

Lack of coordination between departments with responsibility for managing drought.

Lack of progress on drought mitigation.

Failure to review past drought interventions (i.e., post-drought audits).

Lack of success in improving drought awareness through interactions with the media.

Failure to engage private sector, NGOs, and others in drought management.

Failure to understand drought management as a process rather than discrete event.

Changes in government because of reorganization at all levels.

Lack of reliable data on vulnerable sectors and population groups.

Swaziland

Lack of drought policy and plan identified in 1992 as one of the major constraints to the nation's ability to respond effectively to drought.

Absence of legislation to guide drought management program activities.

Inadequate institutional arrangement for drought management program.

Inadequate financial resources to effectively manage drought and other disasters. Too much reliance on donors.

Tanzania

Food insecurity is a product of poverty levels in the country and also the frequency of drought. Repeated droughts do not provide ample time for recovery and results in a growing vulnerability. Food insecurity classified by region and districts based on

rainfall, soils, and inadequate infrastructure and social services.

Estimated that about 6 million people are chronically food insecure, especially women and children. Women suffer most during water and food crises since they have no legal right to own land, unequal distribution of family resources, and lack of access to production inputs and poor production technologies.

A comprehensive system to monitor food security and nutrition issues at the household levels is needed for effective planning and implementation of intervention programs.

Zambia

Rural population has employed strategies to cope with drought which have had a negative impact on the environment (e.g., increase in slash-and-burn cultivation practices).

Persistent droughts have eroded farmers' resource base which limits their ability to acquire fertilizers and other inputs.

Lack of adequate funding is a primary constraint to drought preparedness. For example, the monthly food security bulletin is published every two months because of financial restrictions. It no longer serves as an early warning indicator because of this publication schedule.

Zimbabwe

Development of private trade and informal markets have been hindered by the Grain Marketing Board. The centralized and controlled single-channel marketing system has operated as a disincentive to producers, traders, and consumers. This system has now been removed.

Table 3.

Future Drought Policy and Planning Needs

Angola

Plan of Operations for the actions developed in 1990 are no longer suitable to responding to drought and food shortage problems.

After a survey of the effects of drought in several provinces, the Inter-sectoral Mission of the Ministry of Agriculture and the Ministry of Energy and Petroleum concluded that a regional emergency subcommittee should be formed, drought programs should be a part of the country's development program, extension visits to countries with drought problems would provide beneficial information, and a reconstruction program for the southern part of the country would be needed to be developed to combat drought.

Needs identified include the creation of a food aid system; development of a food for work program, organization of a nutritional monitoring system, creation of a food distribution system, development of institutional capacity to ensure water quality and quantity, and increased imports of foodstuffs.

Rehabilitation of meteorological station network and installation of hydrometric stations on main rivers.

Reinforcement of the capacities of INAMET in terms of training of human resources and computerization of its data procession system.

Re-establishment of the National Rapid Alert System through reinforcement of the operational capaci-

ties of UNAR within MINADER and the GRUPAs in the provinces.

Re-establishment of information exchange and cooperation between the relevant national institutions, with the World Meteorological Organization, regional programs, and sister organizations in SADC countries.

Training of staff in computerized data processing in MINADER, INAMET, and the National Water Directorate.

Creation of a national network of weather and climate information exchange.

Botswana

Links to SADC mechanisms: More emphasis needs to be placed on improving internal coping mechanisms such as mobilization and re-direction of national resources and emergency instruments toward relief to counter the potential and actual effects of drought and mobilization of external resources and support for individual countries and for countries within SADC.

Steps in the assessment of conditions and taking actions during drought conditions work well for localized drought conditions but need to be revised if drought occurred on a regional scale (i.e., within the SADC region).

Improvements needed include strengthening District Drought Relief Committees, exploring ways to get more community participation, modification of steps for early warning and implementation of programs where drought occurs at a regional scale, and conduct of low-cost vulnerability assessments to include more information at the household level.

Indices need to be reviewed and improved in line with changes in operational guidelines.

Existing policies, strategies, and programs need to be consolidated into a single policy document to better understand their role in mitigation, preparedness, emergency response, and rehabilitation. More involvement of other ministries would reduce the burden on a single ministry.

Lesotho

National Disaster Management Plan adopted in 1996. It provides a comprehensive framework for disaster management initiatives in the country. Its principal objective is to improve national capacity for disaster mitigation preparedness, response, and recovery. This plan covers drought and other natural disasters. Effectiveness of the plan is limited by the lack of specificity on the role of NGOs and that it is only in English. An organizational structure defines responsibilities of each agency. This structure is coordinated by the Disaster Management Authority, a statutory government agency.

A National Disaster Relief Task force is formed and provides guidance in times of disaster. Its responsibilities include providing early warning, preparation and updating of National Disaster Management Plans, and public awareness and training in disaster relief.

UN Resident Coordinator holds regular meetings during a disaster with the heads of the resident UN agencies to coordinate response efforts.

National Early Warning Unit formed in 1987 and provides information to decision makers about food security. This unit is a joint effort involving

many government agencies. This information is provided through reports on a quarterly basis. This unit is supported by FAO.

Inter-ministerial coordinating committee exists to ensure effective coordination between various ministries on issues of food security and early warning.

Interventions to reduce poverty levels and vulnerability to drought include development projects, investment in human resource development, special employment schemes, and small business development.

In response to recent droughts, NGOs have been primarily responsible for distribution of relief assistance. NGOs have engaged in capacity building during non-drought periods.

No drought mitigation and preparedness policy exist at the present time. Drought is not considered to be an economic factor and, therefore, does not receive much attention.

Malawi

A Natural Disaster Management Plan has been drafted but more emphasis needs to be placed on long term preparedness and mitigation issues. The following aspects of the drought portion of the plan includes the following aspects of drought management: causes of drought, drought monitoring, risk assessment, mitigation, and preparedness. The plan also outlines food security measures that need to be implemented, including drought insurance schemes, improving drought monitoring, and development of strategic reserves of seed for primary pulses and cereals.

Two early warning systems currently exist; National Early Warning System and the Famine Early Warning System. Both systems are under the

Ministry of Agriculture. FEWS is funded through USAID.

Natural Disaster Preparedness Committee is charged with advising government on policy issues on disaster mitigation. This committee was institutionalized by the Disaster and Relief Act of 1991.

Committees exist at the district and regional levels of government. These committees provide information to committees at higher levels of government.

National Economic Council contains the Food Security and Nutrition Unit which is responsible for coordinating drought management projects between the relevant ministries.

National Disaster Preparedness, Relief, and Rehabilitation Committee is identified in the disaster plan. This committee has the goal of maintaining strategic grain reserves at current levels. This committee is also responsible for introducing irrigation schemes in the country and improving credit opportunities for small farmers.

National Disaster Preparedness, Relief and Rehabilitation Committee is responsible for maintaining strategic food reserves, introducing irrigation schemes, and helping small farmers gain access to credit. Subcommittees exist are focused on food assessment and monitoring; sourcing and procurement; health, water and nutrition; and transport.

Proposed drought management/mitigation actions have been submitted through the National Economic Council. These include short, medium, and long-term activities. Ministry of Agriculture and Irrigation have suggested short term actions which include expanding irrigation,

improved soil and water conservation, improve livestock management practices, and improved food preservation, processing, and storage. Longer term strategies include development of small scale irrigation schemes, electrification to promote irrigation, improved seed varieties. Ministry of Health and Population is seeking funds to improve its capacity to deal with disasters from local to national level. It is also seeking to develop a disaster data base, strengthen early warning systems, and empower communities to take actions on drought preparedness. Ministry of Water Development has developed a plan to monitor water supply sources, rehabilitate/maintain boreholes and gravity-fed schemes, and construct boreholes. They are also planning to construct dam and develop public awareness campaigns.

Mauritius

National Development Plan will incorporate enhancement of storage reservoirs. Irrigation pipelines will be replaced to improve efficiency.

Research on sugar cane and other crop varieties better adapted to dry conditions are being investigated.

Mozambique

Inter-sectoral Group for the Assessment and Identification of Potentially Vulnerable Areas is working on an action plan. In the water sector, the priority is building dams. The Ministry of Agriculture is preparing a strategy for dealing with the impact of an El Niño-related drought, primarily through providing information to farmers on actions that can be taken. This awareness campaign has many facets. Programs have also been developed for tree planting and to address health issues (i.e., the incidence of disease epidemics).

Proposed development of a food security stock is being discussed with possible international donors.

Namibia

Ministry of Agriculture, Water, and Rural Development recently prepared a national policy on drought. Namibia's drought policy is aimed at developing an efficient, equitable, and sustainable approach to drought management. The principal tenets of this policy are to: (1) ensure household food security is not compromised by drought; (2) encourage and help farmers adopt self-reliant approaches to drought risk; (3) preserve reproductive capacity of the national livestock herd during drought periods; (4) ensure a continuous supply of potable water to communities, including livestock, schools, and medical clinics; (5) prevent degradation of the natural resource base; (6) enable rural inhabitants and the agricultural sector to recover quickly following drought; (7) ensure the health status of all Namibians is not threatened by drought; and (8) finance drought relief programs efficiently by establishing an independent and permanent National Drought Fund. The goal of the policy is to shift responsibility for managing drought risk from the government to the farmer. Government interventions will only occur in the case of extreme or disaster droughts.

A disaster drought is defined as a 1 in 20 year event, or drought conditions so intense that they are beyond what can reasonably be dealt with through normal risk management practices. Programs to be used in these years include food security programs; health programs to control diarrhoeal diseases, meningitis, measles, pulmonary

tuberculosis, and vitamin deficiency diseases; livestock programs to encourage improved farm and range management; crop programs for communal-tenure farmers to acquire agricultural inputs and services; and water supply programs which can be completed in time to meet emergency needs and complement long-term water supply development goals and strategies.

Government drought relief programs will be funded by a national drought fund, which will be a permanent institution managed by an independent board. Funds could come from the government, farmers, and donors. Private-tenure agriculture will be financed by farmers, the agricultural industry, and the government. Government contributions will be based on a specific formula. Drought assistance for communal-tenure farmers will continue to be financed by the government. The national drought fund will also finance government programs in food security, health, and water.

Reducing drought vulnerability in the longer term will be accomplished by promoting drought mitigation technologies, creating an enabling policy environment, reducing poverty, and promoting agricultural research, extension, and training and improved veterinary services.

Develop an institutional framework for drought preparedness that includes financial resources and a wide range of mitigation options. Building human capacity for drought planning and response is an important part of this effort. This will be accomplished by the National Emergency Management System (NEMC), an approach which integrates the capacity between the national to local and community levels of government. This system will be

governed by the National Emergency Management Committee. The NEMC is a coordinating committee of senior officials that are directly responsible to the Cabinet.

Emergency Management Unit (EMU) is the focal point for all aspects of preparedness. The EMU will have permanent staff. The EMU will be responsible for monitoring and evaluating as well as training of personnel from government agencies and NGOs. The early warning systems of the Ministry of Agriculture, Water and Rural Development will be used for food security monitoring.

South Africa

Follow through on drought policy initiatives that leads to a risk-based drought management approach.

Progress is being made for a more comprehensive early warning system. Improved weather networks and the creation of a long-lead forecasting forum and an information service have been developed. More information on soil moisture, crop forecasts, area assessment, etc. are needed. More progress on a comprehensive, interdisciplinary early warning system is necessary.

Development of a comprehensive, interdisciplinary early warning system that includes representatives of all relevant department and field-based personnel to help target programs and assistance.

Development of a vulnerability tracking system that is coupled to the early warning system.

Swaziland

National initiatives have been implemented since 1992 but a drought pol-

icy and plan still does not exist. SADC Swaziland National Drought Management Workshop was held in 1994 to review management strategies, identify and examine linkages among institutions, develop national strategies to enhance coping capacity, and develop linkages to local communities, regions, and national institutions involved in drought management.

Workshop outcome was development of a comprehensive plan on national strategies and policies for drought management. National Disaster Task Force established under the Deputy Prime Minister's office. The plan defines responsibilities and terms of reference for institutions involved in drought management and procedures for drought declaration. Plan identified 8 strategies for improving disaster management. Ten policy guidelines proposed are proposed and are awaiting government approval.

Plan establishes an organizational structure for the National Drought Task Force. Numerous subcommittees exist for specific sectors.

Three drought-related early warning systems exist in Swaziland: National Early Warning; Swaziland Meteorological Department; and Rapid Assessment Survey. The National Early Warning unit in the Ministry of Agriculture and Cooperatives produces a food security bulletin which includes information on agro-meteorological situation, crop stage and condition, availability of farm inputs, food security situation, and price information for cereals.

Swaziland Meteorological Department is under the Ministry of Works. Produces weather forecasts which are disseminated to the public. Also produces El Niño

seasonal forecasts with advisories on potential impacts and maps of low, medium, and high vulnerability.

Rapid Assessment Survey is conducted by Swaziland Nutrition Council under the Ministry of Health. Conduct surveys on the impact of drought on children and women and on household income and food security. Information gained from the survey allows for intervention strategies to be developed.

Government launched an intervention to the drought in the early 1990s in 3 phases, extending from 1991 to 1996. These phases focused on provision of drought relief in the form of food relief provided by the World Food Program and NGOs and inputs to farmers from the Ministry of Agriculture and Co-operatives.

Food-for-work program adopted in Phases 2-3 of the relief effort provided food in exchange for working on development projects, particularly those that promote community development and self reliance. Projects identified included rehabilitating eroded lands, construction of earth dams, protection of catchments, removal of silt from dams, improvement of feeder roads, and construction of pit latrines.

Drought Rehabilitation and Soil and Water Conservation Program was funded by USAID in 1993 and has supported a wide range of activities under the leadership of NGOs.

Co-ordinating Assembly of Non-Governmental Organizations (CANGO) coordinates the activities of all 9 NGOs. This helps government entities such as the National Drought Task Force to work more effectively with the NGOs.

Work on a drought preparedness program began in 1997 with the seasonal forecast for El Niño and the call for the adoption of mitigation measures. This program focused on coordination of agencies and alerting donors of possible needs. Another subcommittee was established under the National Consultative Committee on Food Security to design mitigation strategies for crop and livestock farmers.

Drought Preparedness Initiative launched in 1997 with participation of extension staff, NGOs, and private sector participants. Effort was aimed at getting information out on recommended crop varieties, seed sources, drought-prone areas, and so forth.

Additional measures to reduce future drought impacts include construction of dams, implementing water harvesting techniques, and drought research.

Institutional capacity developed in response to the 1991-92 drought remain in place and operational.

Tanzania

Government is focussing on implementing programs designed to eradicate hunger and malnutrition. A National Policy on Poverty Alleviation has been prepared to improve rural income and alleviate poverty. This program needs to be part of a long-term strategy.

Emphasis needs to continue on maintaining emergency food stocks as a safety net during periods of food shortage.

Continued emphasis on involvement of the local community in monitoring and managing food availability at various levels is critical. Improved roads and bridges will be essential as part of improved food security.

Zambia

Insurance needed for small farmers and irrigation facilities. No insurance means that there is no safety net if drought occurs.

Policy on disaster management has not been finalized but is to be considered by the Parliament. The Office of the Vice-President is responsible for developing a disaster policy in consultation with stakeholder groups. Critical to include local communities in the policy development process.

Disaster policy would focus on relief and recovery. Emphasis would be placed on shifting farmers to drought-tolerant varieties, crop diversification, production and distribution of seed, and developing an providing an information system for small farmers that would include information on weather patterns, input and produce market information, and storage information.

Agricultural Sector Investment Program is focussing on sustained agricultural and economic growth. One of its key principles is to optimize the productivity of resources through coordination and planning. This program has identified the following as important: a cost-effective irrigation system; comprehensive research program aimed at producing crop varieties and animal breeds adaptable to drought conditions; crop diversification program aimed at enhancing food security and nutritional status; and a Rural Investment Fund for infrastructure projects aimed at enhancing food security and nutritional status.

Zimbabwe

Activities needed for future drought preparedness actions include institutional development, insurance schemes and stabilization activities,

short-term and long-term drought mitigation programs, national guidelines on nutritional requirements for households and monitoring food standards. Lessons learned from the 1992 drought include: government intervention in the post-drought period can help to facilitate the recovery process; local administrative interference at times hindered distribution of food and inputs; livestock recovery scheme demonstrated that large feedlots were not as efficient and farmers were suspicious of government motivation (i.e. forced destocking) with this program; lack of distribution warehouses caused problems in distributing inputs to farmers; untimely allocation of funds to ministries for procurement of inputs needs to be addressed; and drought management is an inclusive process involving government, private sector, NGOs, donors, and individuals, and each of these need to be well informed.

Government should invest in more distribution warehouses for getting inputs to farmers in a timely manner. Small earth dams should be built to encourage smallholder farmers to diversify. Expanded coverage meteorological data, including better representation of rural areas is necessary. Equipment is unreliable. Better coverage and reliable instrumentation would help with drought early warning. The Early Warning Unit under Agritex is understaffed which results in poor coordination with staff at district levels.

More effective coordination mechanisms need to be developed for donor assistance. Donors are a critical ingredient in drought management and better coordination will improve drought response. Zimbabwe needs to have minimal interference with NGOs in allowing them to conduct their operations. NGOs can help in determining

local knowledge and needs. NGOs actions need to be better coordinated.

Primary need is for drought mitigation to focus on water resources development in the longer term. This is particularly true for small farmers. Large-scale farmers have irrigation facilities available. Clarification is needed from the government on the pricing of water, cost recovery on capital investment, water allocations, and the development of farmer-managed irrigation schemes.

More investment is needed in improving food storage facilities, including research on storage technology and farmer knowledge on storage management. Roads need to be improved to improve distribution of food from surplus regions to deficit regions.

Strategic Grain Reserve should be established to reduce the need for costly imports.

SUMMARY

Drought has plagued all of the countries discussed above in recent decades and often on numerous occasions. An organizational structure has emerged in most countries which, in most countries, has focused on disaster relief in an emergency response mode. This infrastructure includes players from national, provincial, and local/community levels, as well as representatives from church organizations and NGOs. In several cases, countries have become more proactive in recent years by implementing measures that are intended to reduce vulnerability in the longer term. Lack of financial resources is a major constraint in most cases to improved drought preparedness. NGOs are critical elements of drought response and mitigation actions in most countries.

Early warning systems are a critical component of any drought response or preparedness program. Multiple systems exist in many countries. However, a deficiency of reli-

able meteorological data and deficiencies of current observation networks, as well as an inadequate information delivery system was noted in most countries. The World Meteorological Organization, FAO, USAID, and other organizations can play an important role in addressing these concerns.

Human resource deficiencies are significant in the region. Training of technical personnel is another critical element in achieving a higher level of drought preparedness. Investment in human resource development programs is needed.

In the three chapters that follow, regional status and progress in drought preparedness is assessed for eastern, southern, and west Africa. These chapters will further highlight many of the points and findings included in the country reports and in this chapter.

REGIONAL SYNTHESIS REPORT

Drought is a permanent climatic feature of CILSS member countries and many others situated in the Sahel region of Africa. Lying mainly between the isohyets of 0 and 90 mm, the nine CILSS member countries constitute a buffer zone between the Sahara desert and the tropical humid forest. The main characteristic of the Sahelian zone is its particular climate, which makes it most suitable for agro-sylvo-pastoral activities. The region is also endowed with fragile ecosystems, which markedly reduce its potential.

The effects of drought can be characterized as biophysical and socio-economic.

The biophysical impact finds expression in rainfall changes and in the fragile ecological balance.

Since the early sixties, the Sahel region has been experiencing a decrease in rainfall. This has been seen in the shift of the isohyets toward the south. Nearly 85% of CILSS member countries receive a mean annual rainfall of less than 600 mm. This low rainfall has affected agricultural production, the renewal of underground water tables and the maintenance of vegetative cover. Recurrent droughts, inappropriate farming practices and erosion have contributed to upsetting the ecological balance of the Sahelian environment.

The socio-economic impact: a succession of years of poor yields compelled most of the countries to import good quantities of cereals to compensate their deficits, thereby worsening the balance of payments. Socio-economic impacts include difficulties in getting access to water, decreases in purchasing power and public revenue, malnutrition, and migration and social conflicts due to the lack of resources.

CILSS member countries have created various structures to better manage impacts resulting from deteriorating climatic conditions. They mainly involve the constitution, strengthening and management of food security stocks. CILSS countries also have developed a number of tools and mechanisms for drought preparedness and mitigation: Early Warning Systems (EWS), market information systems (MIS), permanent diagnosis (DIAPER), AGRHYMET research centre (agriculture, hydrology, meteorology), and famine early warning systems (FEWS). These tools are used to collect and analyze agricultural production data in order to target the potential risk areas. The information supplied by these struc-

tures is used to help initiate appropriate urgent operations. On the other hand, there is no existing operational sub-regional DPM system, whereas the drought phenomenon is widespread throughout all the concerned countries.

In the farming system, significant changes have been noticed. These changes reflect the farmers' and breeders' ability to adapt to changing situations. Efforts to enhance productivity and soil fertility through organic matter management resulted in raising compound animals and crop cultivation.

Local initiatives receive support from CILSS member countries, NGOs and international organizations. Since the beginning of the 1990s, agricultural policies with the principal objectives of modernizing, diversifying agricultural productions, ensuring food security and enhancing natural resources management have been adopted.

To attain these objectives, each country needs to adjust its role to ensure effective participation of rural producers and grass-root organizations and make them aware of their responsibilities. The democratization process, economic liberalization and decentralization policies must bring about a reorganization of governmental structures and greater participation of NGOs and various partners working in the rural milieu. The fundamental objective that underlies all these actions is sustainable economic growth to provide better food security and rational natural resources management.

The creation of the National Action Programs (NAP) and the Sub-regional Action Programs (SRAP) brought to the fore a series of activities that dovetail with the objectives of this effort to assess the status of Drought Preparedness and Mitigation (DPM). DPM measures in the Sub-Saharan region should include not only early warning systems but also specific integrated rural development programs, better economic planning (including long-term poverty programs), and livelihood sustaining rural works initiatives.

In spite of reforms and the various development programs and projects initiated by the countries, the DPM remains poorly defined and inadequately integrated into action plans that preceded the ratification of the Convention to Combat Desertification (CCD).

The national studies made a number of recommendations, including the following:

- Contribute to making the SRAP a sub-regional blueprint for



- consultations and actions to integrate the DPM into programs to combat the effects of drought and desertification;
- Define the DPM concept;
- Determine balanced and equitable distribution of roles and responsibilities among the various actors;

- Consider the role that Sahelian women can play in the DPM action plans;
- Put emphasis on awareness-raising, training and information;
- Enhance the value of traditional systems under the DPM.

SENEGAL

Since 1960, Senegal has been experiencing a downward trend in its mean rainfall and a regular extension of the Sahel region. The frequent droughts have brought in their wake soil degradation and a decline in water quantity, resulting in plummeting productivity of the country's major agricultural activities (cereals, groundnuts, livestock, etc.).

These droughts have affected all segments of the population, but it is the rural populations that have been hardest hit. Faced with this situation, the rural population has developed many strategies to mitigate the effects of drought, including the introduction of new varieties of crops (cowpeas, water melon, etc.), diversification of sources of revenue and rural exodus or emigration.

The strategies adopted by the country's authorities have focused on:

Institutional reforms;

- Setting up structures and institutions to implement government policies on drought (the Ministries of Water Resources and Social Development);

- Designing a program to combat poverty through diversification of revenue sources, especially in the rural milieu, and providing incentives for private initiatives;
- Formulating policies aimed at ensuring food security through early state intervention by providing support to agricultural and pastoral productions;
- Formulating prevention policies on drought management by adopting a National Action Plan integrating monitoring and an evaluation of response measures to address drought effects;
- Setting up specific programs and projects like the AGRHYMET Centre (agriculture, hydrology, meteorology), DIAPER (Permanent Diagnosis), and EWS (Early Warning System) to be in charge of preventing food crises and Market Information Systems (MIS) to collect data.

Among the many programs and projects, the Agro-sylvo-pastoral Unit for Food Security (CASPAR) plays a prominent role in centralizing, processing and disseminating all information on food security from the different structures.

Senegal receives support from many partners. Notable among them are CILSS, UNDP, USAID and many NGOs.

BURKINA FASO

Burkina Faso, a continental country situated in the heart of West Africa, has had three major droughts since 1970: 1973-74, 1983-84 and 1990-91. The most affected areas were the northern provinces (Oudalan, Seno and Soum) and the provinces of the central plateau.

The droughts have had disastrous consequences on various activities in these zones, but less disastrous consequences in other areas. Agricultural activities, which are the mainstay of the national economy, have experienced considerable losses.

In 1984, the drought caused serious losses in livestock production, ranging between 20% and 30%, depending on the region. Agricultural deficit was estimated at 163,000 tonnes.

The most disastrous impacts on the physical environment are the pronounced degradation of soils and the disruption of the already precarious balance between man and nature.

Socially, the negative effects are famine, mortality, and exo-

dus or emigration of the rural populations that are most vulnerable to sudden climatic changes.

In response to this situation, the country's authorities, supported by different partners (notably NGOs, sub-regional organizations like CILSS, and international organizations [UNDP]), have designed specific strategies to prepare for drought and mitigate its effects.

These strategies focus on several activities. The most important of these are:

- The development of projects and programs likely to enhance food security, diversify production activities, make the people aware of their responsibility to environment-related issues, and exploit climatic conditions in the different zones in the country. The Sahel Burkinabe Program (SBP), the various Integrated Rural Development Projects (IRDP) and the Conservation of Soils and Water/Agro-Forestry Unit (CSW/AF) were created for this purpose.



- The creation of specific preventive structures such as the Food Security Information Coordination Committee, which is in charge of centralizing and analyzing information on food security, and the Early Warning System, which assesses the probability of risks.
- Food security management structures specifically in charge of managing drought effects: Advisory and Cereal Policy Monitoring Committee, charged with the responsibility of coordinating cereal policies; the SONAGESS

(National Food Security Stock Management Company), whose task is the management of security stock (35,000 tonnes); and CONASUR (National Food Aid and Rehabilitation Committee), whose task is to sensitize, inform and train personnel and the population on actions to take in the event of disaster.

The study's recommendations included strengthening existing structures, a higher degree of NGO involvement, intensification of information dissemination and training the population.

CHAD

Covering an area of 1,284,000 km, Chad is a landlocked country, with more than half of the territory lying in the desert and Sahelian zone. The following regions are more vulnerable to drought: Kanem North, Batha, Beth, Baltine North, Ouadda and Guera.

The economic impact of droughts was manifest in the decline in agricultural production (losses range between 15% and 100%, depending on the regions) and a high mortality among livestock. In both cases, the results are a generalized famine, massive exodus of the rural populations and the concentration of the rural populations in less affected regions.

Environmentally, the droughts caused decreases in available underground water, thereby causing desertification and forcing animals to migrate to the mild climatic zones, which exposed them to poaching and major epidemics.

To mitigate the effects of drought, the country's authorities rely on a whole set of structures with help from international institutions and organizations. The state machinery comprises all the Ministries: Agriculture, Animal Husbandry, and

Water. Through their departments, the ministries' activities are centered on preparations for drought, in advance of drought, and management of drought effects, when drought occurs..

The main structures involved are:

- Agricultural Productions and Food Security Department (APFSD), whose tasks include collecting and disseminating information on cereal markets, making estimates for agricultural production, evaluating the food situation, distributing food items to affected people, and organizing emergency aid.
- The National Cereal Office (NCO), in charge of food stocks.

The state machinery receives support from various organizations, including NGOs, which play the leading role.

Actions deemed necessary and desirable by the study are:

- Dissemination of drought-related information;
- Raising awareness among the people
- Increasing capacity for security reserve stocks in the different regions, especially the more exposed ones.

MAURITANIA

Analysis of the climate shows that droughts are a constant phenomenon in Mauritania. Rainfall deficits that had been limited to the northern part of the country before 1981 are now gradually being extended to the rest of the territory.

Between 1960 and 1978, the desert claimed 14 million ha of land, causing the disappearance of several perennial pools, reduction of the underground water resources by 20 metres, and pronounced soil degradation.

Economically, the decrease in rainfed agricultural production and changes in the pastoral systems have led to perpetual food insecurity and massive exodus of the rural populations (farmers and breeders).

The people have worked out several strategies to adjust to drought and more especially to mitigate its effects.

In the agrarian sector, whereas the farmers were only able to cope with the climatic changes by increasing cultivated areas, breeders developed very original strategies that combined mobility, diversification of species, selection of species more resistant to the rigours of climate, dispersion of animals (dividing them into smaller units and entrusting them to close relatives), and intensification. All these strategies are transmitted to future breeders through basic education.

Until 1983, political and administrative activities in the field were mainly sectoral, without coordination and coherent strategy. Very often, these activities were limited to tree

planting, residual ecosystem defense, and distribution of food aid, to the detriment of preventive actions. In the tree-planting exercise, participation and involvement of the people were conditional on promises of distributing food items or money. Reneging on these promises caused the people to lose interest in, and commitment to, the different environmental protection initiatives.

In spite of help from some partners like the UNDP (through UNSO) and the USAID, there are no systems for forecasting drought, and there are no structures for preparing for and mitigating drought. Drought policies are summed up in simple actions of tree planting or sand encroachment control.

NIGER

Niger is a vast landlocked country of 1,267,000 km. Its soils are prone to wind and water erosion.

The effects of an unfriendly climate, high temperatures and rainfall reduced to a maximum of five months are compounded by successive and repeated droughts. Almost the entire country (about 97%) lies within the agroclimatic zone ranging from the Sahel to the desert. The country has a chronic cereal deficit problem, with adverse social consequences of food insecurity, impoverishment and social crises.

To mitigate the effects of drought and improve living conditions, the country's authorities, in collaboration with the international community and NGOs, have put in place several structures to enable intensification and diversification of production. These structures focus on two major actions:

- medium and long-term actions or rural development actions;
- short-term actions to compensate for case-by-case effects.

These actions were carried out on several fronts:

- Institutionally, through the adoption of regulatory texts;
- Decree on rural code governing the management of land, plant and water resources;
- Law on determining water use conditions;
- Law on the adoption of an economic recovery program.
- Preparation of wide-ranging programs and plans like:
- National master program to combat poverty, with a view to ensuring participation and involvement of the people in

These activities are undertaken by the rural communities under the "Food for Work" programs championed by the Food Security Commission (FSC), the World Food Program (WFP), or projects funded from external sources.

The recommendations made include the following:

- The need for greater understanding of drought;
- The need to link drought prevention and management policies.

These policies must fall within one structure, which, based on an early warning system, will be responsible for protecting exploitable areas, carrying out emergency actions in zones severely hit by drought, and working out long-term actions.

the programming process and program implementation;

- National disaster management plan, aimed at defining the roles and responsibilities of the various agencies/groups involved.

Creation of structures like:

- The Food Security Unit, charged with the responsibility of designing food security programs, monitoring and evaluating development programs and providing methodological support to regional food security committees;
- The National Early Warning System and Disaster Management Committee (NEWS/DMC), to be in charge of giving warnings about crisis situations, monitoring and evaluating crisis situations, making appropriate proposals and coordinating the implementation of response actions. The Committee will also be in charge of carrying out community-based micro-projects or activities to protect and restore the environment.

Following a diagnostic review, the following recommendations were made:

- implement appropriate agricultural development policies;
- emphasize improved food security through the development of an emergency food stock;
- redefine the state's role;
- give priority to some areas of activity.

CAPE VERDE

Drought is a permanent characteristic of the Cape Verde archipelago, with a predominant long dry season (7-9 months) and a short and random rainy season.

It is difficult to evaluate the effects of drought in the Cape Verde because few studies have been devoted to the subject.

Notwithstanding, existing data makes it possible to measure the magnitude of drought in the sudden decline in agricultural yields, with its accompanying results of famine, malnutrition, mortality, rural exodus toward urban centers, unemployment, impoverishment and emigration hitting the rural population particularly hard.

Until recently, the various systems put in place by the authorities were geared toward assistance and emergency aid to the affected people. Since 1991, the state has attempted to map out a global development strategy that integrates preparations for drought and management of its effects. Prevention activities mainly deal with land management and soils and water conservation and defense.

Prevention activities and food crisis management are under the supervision of the Ministry of Agriculture, Food and Environment (MAE) working in collaboration with the Ministry of Trade and Cooperation.

In the execution of its duties, the MAE relies on:

- The NFSC (National Food Security Commission), which is responsible for the collection, processing and dissemination

- of information on the food situation in the country;
- The NSE (National Supplies Enterprise), in charge of cereal importation and food aid management.

The state receives support from some organizations, especially the Cape Verde Red Cross and Caritas.

It is also noteworthy that the rural population adopted strategies to mitigate climatic risks through family economy management, the practice of mixed farming, diversification of income-generation activities and selection of more resistant species.

The study came out with recommendations on institutional reforms, (decentralization) policies, and involvement of the population in all stages of drought provision and prevention procedures.

MALI

Mali is a continental country covering 1,200,000 km. Like the other Sahelian countries, it faces the rigours of a climate characterized by unpredictable and very often unevenly distributed rainfall. All localities of the country are threatened by drought risks at least once every 14 years. However, in some regions, especially those lying above the 14th parallel, drought regularly occurs every 4 or 6 years.

Droughts have a negative impact on national productions. The 1984-85 farming season registered a cereal deficit of 150,000 tonnes, which was compensated for with imported cereals. Data available at the national level often mask the more alarming situations occurring at the local level. For example, cereal production in the Gao region, which stood at 40 kg per head during the 1983/84 farming season, declined to 5 kg per head during the 1984/85 season.

In addition to the effects of drought, human activities also contribute to the pronounced degradation of the physical environment. Agriculture, which makes a very substantial contribution to the Gross Domestic Product (GDP), is the sector most vulnerable to drought and its effects.

The rural populations therefore have the greatest exposure to famine, mortality and food insecurity.

Several mitigation strategies have been adopted. In addition to the governmental structures, many NGOs have undertaken measures to strengthen the collection, processing and dissemination of information on climatic changes in the different zones of the country. The main objectives are prevention and management of food crises through an evaluation of cereal deficit and areas affected, movements of people and animals, vulnerable groups, and sanitation.

Even though NGO activities allow greater participation of the people and a better consideration of their needs, there is no state coordination of these activities. Despite the adoption of a common platform by the government and donors, the mitigation strategies are fraught with inadequacies, which have been identified by the study.

In light of these deficiencies and considering the existing problems, recommendations focused mainly on enhancing the current system, improving the functioning of the cereal market, redefining the state's role, and involving decentralized structures and NGOs.

GUINEA BISSAU

Due to its climatic conditions and more especially the significant rainfall, Guinea Bissau is not beset with the problem of drought to the same extent as the other CILSS countries. However, despite its favorable climatic conditions, Guinea Bissau does have a rainfall deficit in some years. Rainfall is generally sufficient to meet water needs for crop cultivation. Rainfall in Guinea Bissau is unevenly distributed. In addition,

some regions suffer from demographic pressures due to population migration. This pressure plays a part in the degradation, in the medium and long term, of physical and biological resources. It affects agricultural, pastoral, fish and forestry resources. The food security situation is of great concern for low-income population groups.

Even though desertification is not a problem in most regions, the rate at which productive resources are being destroyed underscores the incompatibility of intensified production and conservation of nature. Hence, the study aims at making an in-depth analysis of ecosystem degradation and which areas are most affected. It also seeks to assess activities carried out by the various agencies (the State, NGOs, the private sector, grass-root associations) and formulate proposals.

In the institutional and operational domains, it can be said that few actions have been developed to implement of the Desertification Control Convention because of the confusion and indecision in the State machinery. Many agencies/groups work on environmental management without consulting the others. Most of the activities planned or programs adopted are not implemented.

In Guinea Bissau, NGOs are involved in activities to sensi-

tize the rural population to the problems of conservation of nature and to carry out development activities. This strategy will promote the emergence of local institutions to help with the process.

The State has recently drawn up a master plan with the support of international organizations (UNDP, IUCN, FAO). At any rate, clarification of the land tenure problem currently under deliberation at the national parliament will be significant for the land management issue and lead to the institutionalization of development objectives.

To halt environmental deterioration, it is important to formulate clear and rational policies. Future policies and actions must consequently emphasize the legal component, the involvement of NGOs, information dissemination and awareness-raising among the people and, finally, strengthening early warning systems.

THE GAMBIA

The Gambia is a poor agrarian country situated on the West African coast. Drought is endemic to the country. This situation is exacerbated by a high population growth rate, limited access to financial resources, environmental degradation, erratic rainfall, poor communication facilities and fluctuating market prices.

In the Gambia, a drought year is said to be a year in which the annual rainfall amounts to 75 percent or less of normal rainfall. According to statistics, drought in the Gambia can be expected once every three years, and it has an impact on crop and livestock production and food availability. Thus, during the 1983 drought, which was the worst on record, the monetary losses incurred by farmers and government amounted to US \$14.9 million (1983 US dollar value). The number of cattle and small ruminants dwindled sharply because they were sold to ward off the effects of the drought. There was less food available for communities and families, and some of them resorted to drought relief.

With the assistance provided by international and intergovernmental agencies (particularly, the World Food Program of the United Nations and bilateral and international NGOs), the Gambian government has endeavored to reduce the impact of drought on the national economy and on local communities

At the official drought management level, emergency actions consist of relieving the physical hardship of drought on people, mobilizing food and banking resources at the national level, supplying food to drought victims within the framework of Food-for-Work, and providing seeds to farm-

ers. In the long term, actions undertaken before and after drought to reduce the vulnerability of the population include institutional capacity building, adaptive research for drought-resistant/tolerant crops, construction of dikes, village seeds stores, and food production.

At the local community level, activities consist of risk prevention and loss mitigation strategies. Risk activities that have been practiced over a long period of time include plot dispersal (securing plots in the different agro-ecological zones such as uplands and lowlands), crop and livestock diversification, herd migration and jobs diversification. Loss minimization strategies are overwhelmed during a severe or a multi-year drought. They include market-, agronomic-, mobility-, relief- and social-based strategies.

The absence of a coherent drought policy backed up by a comprehensive drought preparedness plan, the lack of financial resources and trained personnel, the limited environmental awareness level among the local population, and poor communication between the different actors combine to frustrate efforts to manage the drought hazard in the Gambia. New strategies need to be created.

An in-depth assessment of resources, policies and institutions is necessary, and new measures should be taken for efficient drought relief and mitigation which will require, among other steps, a comprehensive drought policy and preparedness plan, the presence of the necessary physical infrastructure, the availability of sustainable livelihoods and drought-related environmental and social research.

DROUGHT OCCURRENCE IN SADC

The recent drought episodes experienced in the SADC region reveal that droughts are not once-off disasters in the region. They are frequent phenomena that can be forecasted, and they will occur at least in the foreseeable future, unless dramatic climate turn-arounds occur. During the period 1980 to 1996, the region was struck by four droughts: 1982-83, 1987-88, 1991-92, and 1994-95. Three of them (1982-83, 1991-92, and 1994-95) were severe regional-scale droughts, and the 1991-92 drought was the worst in the region's living memory.¹ All droughts were linked to the occurrence of a warm El Niño-Southern Oscillation (ENSO) phenomenon in the Pacific Ocean. Based on the current (1997) state of the ENSO, meteorologists strongly predict the occurrence of yet another region-wide drought in the 1997-98 agricultural season, which is expected to be even more devastating than the one in 1992.

Drought affliction has been even greater in some countries. For example, over the last twenty years, Mauritius has experienced 14 droughts; 9 of these were widespread while 5 were confined to certain regions. Over the same period, Swaziland experienced 6 droughts, 4 of them in consecutive years from 1991-92 to 1994-95. In Tanzania, drought occurrence followed a cyclic pattern, with a drought occurring every 3-4 years during the period 1970-89 and then every 4-5 years afterward. In other countries, drought (depending on the definition) has been a permanent feature within certain regions (e.g., the coastal areas of Namibia and the dry middle- and low-veld areas of many countries in the region). In Mozambique, every year there are drought spells in some parts of the country, and some of these are preceded by flooding.

These statistics clearly point to the fact that droughts in the region are frequent and a calculable risk. Their general predictability permits long-term planning, with sustainable proactive (rather than short-term and often reactionary) drought mitigation measures. The time has come for the region to tackle droughts head-on as a development challenge rather than as an emergency or crisis situation.

EXPECTED PRINCIPAL IMPACTS OF DROUGHT

Droughts are associated with debilitating negative shocks on national economies whenever they occur. Drought conditions cause reductions in water supplies to various classes of

users (agriculture, industrial and domestic) and reductions in hydro-electric power generation. These developments may result in crop failure and livestock death, rising food prices, and output reduction in other agriculture-dependent sectors (as well as water- and energy-intensive, non-agricultural sectors of the economy) thereby leading to a decrease in GDP, job losses, and food insecurity at both household and national levels. Food imports may become imperative, and these, together with declining exports, could worsen the balance-of-payment positions of affected countries.

Governments may be forced to intervene and cushion the vulnerable population to minimize suffering and prevent loss of life. To successfully run massive relief operations, governments may be forced to run huge fiscal deficits and borrow. Government borrowing to finance food imports or to provide drought relief could crowd out the private sector, causing an upward surge in inflation and interest rates and further restricting investment and opportunities for longer-term economic growth. Further, unless drastic actions are taken to reverse these conditions, a country may become trapped in a vicious cycle of depressed investment, leading to depressed output growth, which in turn may lead to depressed savings and investment.

In areas where livestock stocking rates exceed carrying capacities, droughts can exacerbate environmental problems of land degradation. The same applies to areas that are overpopulated and where the population has a strong "appetite" for veld fires, yet legal and institutional/administrative mechanisms to prevent or control these fires are absent.

A general reduction in domestic water supply that takes place as a result of a drought episode may affect water quality, which often has negative consequences for health and sanitation in both urban and rural areas.

These impacts indicate that drought is not just a food problem but also an economic, social and environmental problem. Strategies to mitigate the impacts of drought must recognize this fact.

DEFINITIONS OF DROUGHT

Before looking in more detail at the primary economic, social and environmental impacts of recent drought episodes, it will be useful to review definitions and indexes of drought that have been used to track or detect emerging

drought conditions in the region. These definitions are based on five major criteria, including meteorological, agricultural, hydrological, and the more recently developed economic and social.

Meteorological. Meteorological definitions are generally based on comparisons between actual and expected rainfall amounts, with a drought sometimes defined as a period when less than a certain amount (e.g., 70%) of normal precipitation is received in any large area for an extended period. The Southern Oscillation Index and the El Niño are used to detect emerging drought conditions.

Agricultural. Agricultural drought relates to an imbalance in the moisture content of the soil during the growing season. Although influenced by other variables such as the crop water requirement, soil water-holding capacity, and the degree of evaporation, soil moisture content is largely dependent on rainfall amount and distribution. Agricultural drought is said to have occurred when rainfall amounts and distribution, soil water reserves, and evaporation losses combine to reduce moisture availability below the optimal level required by a crop during different stages of its growth cycle, causing impaired growth and a decline in crop or livestock yields. The indicators include the quality of crop vegetative cover (as measured by, for example, the Normalized Difference Vegetation Index), the length of dry spells at crop flowering stage, and the quality of grazing. Determination and measurement of drought using these indexes is complicated by the fact that the indicators are also influenced by other variables such as use of fertilizer; control of pests, diseases, and weeds; plant spacing; and exogenous factors such as producer price incentives and overall market conditions. These factors make it difficult to isolate the impacts of soil moisture deficits.

In addition to applying to a specific period of growth, some agricultural drought definitions have been developed that are crop specific and based on a combination of criteria. In Mauritius, for example, the definition of agricultural drought is based on sugar cane, the country's major crop, and drought conditions are considered to have occurred when the sum of monthly deficits in rainfall during the growth period (November to June) exceeds 380 mm.

Hydrological. Hydrological drought is related to the condition of surface and subsurface water supplies in comparison to normal or expected levels. It occurs when there is

substantial deficit in surface run-off below normal conditions or when there is a depletion of ground water supplies. Hydrological drought reduces the supply of water for irrigation, hydro-electric power generation, and other household and industrial uses.

More recently, there has been a shift toward defining drought using multiple indexes to improve the precision with which drought is determined and tracked when it occurs. Hence the challenge for future drought identification and measurement appears to be in devising systems that integrate a number of indexes, including moisture, crop yield, vegetation cover, rainfall, and soil cover, while at the same time incorporating a meteorological index as a threshold.

Economic. An economic drought is considered to have occurred when water supply for productive activities in the economy (including water for human consumption) declines below levels with which the country is capable of coping, thereby affecting agricultural output, related productivity, employment, and the wider economy. As highlighted earlier, a drought of this nature may have potential knock-on effects on fiscal and monetary policy variables such as the budget deficit, inflation, interest rates, savings and investment, and the balance of payments.

Social. A social drought occurs when water availability is not sufficient to sustain human activity.

IMPACTS OF RECENT DROUGHT EPISODES IN THE SADC REGION

Economic Impacts

Most economic impacts of previous droughts experienced in the SADC region have been transmitted through the agricultural sector. In general, agriculture, because of its dependence on weather and the fact that it is often the first user to be sacrificed in the event of a water shortage, appears to be the sector most vulnerable to drought. Hence, in previous drought years, economies that were relatively less dependent on agriculture per se (e.g., South Africa and Botswana) experienced shocks of lower intensity than those more dependent on agriculture (e.g., Malawi and Zimbabwe). In Zimbabwe and Malawi, a plunge in GDP of about 8% was experienced during the 1991-92 drought, whilst in the case of South Africa and Botswana the fall in agricultural GDP, although significant, only shaved a few percentage points off growth. In Botswana, a long history of frequent droughts and reliance on

food imports even in normal rainfall years had a major impact on the way the policies and programs had been developed to cope with drought, and indeed explains the country's relatively better performance in drought management.

Throughout the region (even in those countries with economies that are less dependent on agriculture), the 1991-92 drought had a drastic impact on agricultural output, with total crop failure and massive livestock deaths being recorded in many parts of the region. The rural populations living in drier areas were the worst affected. Both domestic food supply and exports were curtailed. Subsequently, food shortages and imports forced an upward surge in food prices (sometimes 60-120%), further threatening household food security among the vulnerable groups. Some of the highest food price increases occurred in Zimbabwe and Tanzania. The impacts in some of the countries were made worse by other aggravating factors: civil war and poverty in Mozambique; land degradation, unemployment and a preoccupation with preparations for the return to civilian rule in Lesotho; and poverty and lack of institutional capacity to deal with droughts in the newly independent Namibia. There were many other hardships related to the short-term negative effects of macro-economic reforms that many countries in the region had just embarked on.

As the agricultural sector contracted, so did job opportunities. In many countries, employment in the agricultural sector was reduced significantly. For example, job losses of 70,000 were estimated in just one province of South Africa (former Northern Transvaal) during the 1991-92 season.

Many governments embarked on massive drought relief operations to reduce the impact of the drought on vulnerable populations (Table 1). In many countries, politically driven blanket relief operations, with little targeting, were implemented. This placed a heavy burden on government expenditure. In some countries (e.g., Zimbabwe), the fiscal and monetary implications were obvious: a high budget deficit (10%), heavy domestic borrowing (80% of total borrowing), high interest rates (40%), high inflation (42% at its peak) and a crowding out of private sector investment. In other countries (such as Namibia), long-term development projects were cancelled and funds were re-allocated to relief operations. Many ministries had their annual budgets cut to accommodate the drought emergency situation. In some countries the drought shock was so severe that macro-economic reform programs were completely derailed.

Table 1.

Number of People on Drought Relief Register During 1991-92

Country	People on Register	% of Total Population
Angola	—	—
Botswana	—	—
Lesotho	415500	—
Malawi	6100000	65
Mauritius	—	—
Mozambique	9000000	56
Namibia	—	—
South Africa	—	—
Swaziland	409600	48
Tanzania	949000	3.6
Zambia	2,500,000+	—
Zimbabwe	5600000	50

Low water levels in dams affected hydro-electric power generation and supply. Some countries stopped exports of electricity from outside the region (e.g., as far as Zaire). Water rationing and load shedding became common in many countries at the height of the drought in 1992, posing difficult choices in water allocation between industry and agriculture. Energy-intensive and water-intensive industries were among the hardest hit. Among them were fertilizer and textile manufacturing industries, respectively. Industrial production was thus drastically reduced, forcing firms to lay off substantial numbers of workers. Electricity and water rationing also affected the provision of other economic and social services, especially in urban areas.

Social Impacts

The social impacts of previous droughts were equally severe. In Mauritius, a country almost entirely covered with potable water systems, conditions were so severe that total cuts of water supplies were, in some instances, inevitable and the Central Water Authority (the agency responsible for water treatment and distribution) was forced to supply consumers through mobile water tanks. This placed many people at risk from drinking unsafe water as the water level in reservoirs became low, even though consumers were advised through various types of media (the radio, television and the press) to boil the water before use.

In another example, during the recent drought in South Africa, falling water tables in Kwaulu Natal Province result-

ed in 150 boreholes drying up, and rural communities (and women in particular) bore the brunt of the negative consequences as they had to walk distances of sometimes 20 km a day to the nearest water source. Similar experiences were also faced in Zimbabwe, where the problem was exacerbated by frequent pump breakdowns, broken water distribution infrastructure, and total absence of public boreholes in wetter regions, where a drought of such magnitude had never been experienced before 1991-92. The brunt of the impact was borne by the most "vulnerable" (i.e., children under 5 years; students between 5 and 12 years; pregnant and/or lactating women; the elderly; and the physically handicapped). Henceforth, safeguarding the lives and health of members of these vulnerable groups became the overriding concern in national drought relief programs not only in Zimbabwe but throughout the region.

Water shortages also affected urban settlements in that there was little water for drinking. Most urban centers went without normal water supplies for weeks or months at the height of the drought in 1991-92. Shortages of water in both rural and urban areas had serious negative health and sanitation consequences. In Lesotho, six of the major towns and 20% of the villages (a population of 250,000) faced water shortages in October 1992. Another 40% of the villages were added to the critical list by November, and these water shortages were linked to an outbreak of typhoid fever, whose prevalence was exceptionally high in many of these areas. This incidence of typhoid almost ran parallel to the worst cholera outbreak in the history of Mozambique, which occurred in 1992 during conditions of critical water shortage in urban areas with 31,000 severe cases and 750 deaths. These tough conditions were thought to have contributed to the spread of *Shigella* dysentery type 1 that plagued Mozambique during the same period, spreading to 80% of the country's districts and affecting a total of 47,000 people by 1993.

Environmental Impacts

The impact of previous drought episodes on the environment has become a major cause for concern in the SADC region. With a rapid population growth of about 3% per annum prevailing in most countries, the pressure on the limited natural resources for increased agricultural production has been mounting, causing encroachment in marginal areas. Rapid population growth, an increasing livestock population, overstocking, and indiscriminate burning of grass and the relentless cutting down of trees (which have been going on unchecked, particularly in the rural areas) have all exposed the environment to great risk during times of drought.

Although the environmental impact of previous droughts has not yet been assessed, there is no doubt that the impact has been very large. The impacts of previous droughts on the environment are detectable in many ways. First, droughts retard the natural process of regeneration, yet extractive agricultural practices will not stop, given the rapid growth of human and livestock populations even during drought years. Second, in the event of a drought, livestock populations travel longer distances in search of the limited water supplies and destroy more vegetation. Third, a drought limits the amount of pasture available, thereby indirectly contributing to overgrazing and the subsequent erosion of soil fertility that occurs when rains resume. Fourth, droughts create conditions most conducive to devastating veld fires, which, apart from eradicating beneficial fauna and flora, also pollute the environment. In Tanzania, droughts have had a drastic impact on some vulnerable tree species in many natural forests. Bush fires have also, over the years, devastated hectares of reserve forests. Fifth, recently, droughts have exacerbated water pollution problems in urban areas, especially where effluent from industry has been discharged for recycling into freshwater reservoirs. Sixth, the hardships experienced under drought conditions leave little room for investment in natural resource management because people will be preoccupied with ensuring food security at both household and national levels.

DROUGHT PLANNING AND PREPAREDNESS IN SADC

Drought Policy

The absence of a drought policy is as conspicuous at the regional level as it is at the national level.² Yet SADC's experience suggests that the successful management of drought in the future will require that governments come up with a strategic policy framework not only for resource mobilization but also for ensuring that short-term efforts are not divorced from and do not jeopardize longer-term development goals. In fact, these short-term efforts should support longer-term development goals. In some countries (e.g., Swaziland) the lack of a clear policy on drought has been widely acknowledged as one of the biggest institutional constraints on that country's ability to effectively respond to the 1991-92 drought.

There is some evidence that the likelihood of droughts in the region is increasing. In view of the recurrence of droughts in the region and the magnitude of their negative impact not only on food security but also on the performance of the economy, the social sectors and the environment at large, long-term strategies to mitigate the impacts of drought are

clearly needed in the region. The success of regional response during the 1991-92 drought (at least in terms of meeting food needs) demonstrated that regional action to ensure the swift planning and execution of drought mitigation measures is beneficial. The free exchange of information (especially early warning); strong coordination provided by regional institutions like the Regional Drought Task Force, the Logistics Advisory Centre (LAC) and the Drought Monitoring Centre; and the success of a joint appeal to the international donor community should form a strong building block for future cooperation.

Yet such cooperation should at the same time take cognizance of the changes that have taken place in the socio-economic and political environment of the region and globally. What is worth noting here are (i) the economic reforms that have been introduced that have radically altered the role of government in influencing economic activity (and, hence, food security), (ii) the emerging role of the private sector, (iii) the increasing role of trade in regional food security, (iv) dwindling development aid flows to the region, (v) the declining contribution of agriculture to GDP (and food security) in many national economies and (vi) the growing recognition of the role of poverty in food insecurity.

The foundation for a process of formulating drought policies at both national and regional levels has already been laid through several national workshops and the Regional Drought Management Workshop, which was held in Harare 13-16 September 1993. These workshops were conducted to review the experience of countries in managing the 1992 drought and to identify ways in which long-term strategies could be developed. The process culminated in the production of a workshop report in August 1994, which includes a summary of findings and recommendations made at the workshop and another draft discussion paper prepared in 1996 on long-term strategies for drought management.

A number of other regional meetings, including a workshop in Harare in late 1994, a brainstorming session in 1996 and a conference in 1997, have also been held to discuss the process of formulating a regional food security strategy. The exercise culminated in the production of a food security strategy framework in June 1997, which should provide further input into the regional drought policy framework. There is no doubt that, in the same spirit, an opportunity is being provided to continue this process in the Drought Policy Seminar.

Three over-arching principles of such a process of reaching consensus on a regional (or national) drought policy need reiterating: drought is not just a food problem but is also an eco-

nomie, social and environmental problem; drought in the region is not a once-off disaster but rather a recurrent phenomenon, representing a calculable risk to income growth and stability; and successful management of drought requires that governments create a strategic framework for resource mobilization that can ensure that short-term relief efforts support (rather than impede) longer-term development.

Strategies to mitigate the impacts of drought must, therefore, be integrative. They must be developed with a clear understanding that preventing hunger and malnutrition will not eliminate the looming disaster. Policy response should also be based primarily on measures that reduce long-term vulnerability and increase incomes, combined with insurance mechanisms and contingency plans that enhance the level of preparedness. Short-term relief measures should provide a safety net that meets immediate needs for health and consumption but also contributes to the long-term objectives of income growth and diversification.

Key elements of a short-term policy response should include the following:

- setting criteria for the delineation and mapping of targeted vulnerable groups;
- selecting the most efficient and effective targeting method;
- selecting the most appropriate safety net (type of assistance);
- setting guidelines for resource mobilization (both human and financial); and
- establishing efficient and effective implementation and coordination mechanisms (including administrative oversight).

Key elements for a longer-term policy response could include the following:

- establishing systems for longer-term vulnerability tracking;
- identifying measures for reducing risk and vulnerability;
- identifying measures that encourage self-reliance and obviate the usual tendency of a dependency syndrome;
- delineating and assigning roles to actors (government, the private sector or individuals, NGOs, etc.) best able to perform those roles;
- setting guidelines for resource mobilization; and
- establishing effective and efficient implementation and coordination mechanisms.

OPERATIONAL ISSUES

Regional early warning system

Objective

One of the most important drought preparedness measures for the region has been the establishment of a SADC Regional Early Warning System (REWS) that provides mem-



ber states and the international community with advance information on food security prospects in the region. The REWS, a project within the Food Security Technical and Administrative Unit, comprises a Regional Early Warning Unit based in Harare and autonomous National Early Warning Units (NEWUs) in each of the SADC member states. The regional and national units provide early warning and food security information on:

- food crop performance, especially providing alerts in case of crop failures, and other factors affecting food supplies;
- food supply and demand assessments and projections, including imports and exports; and
- food-insecure areas and the populations involved.

Types of data and information provided

The REWU compiles food security data for the region, based on contributions received from various NEWUs, and aggregates this for subsequent publication in the Quarterly Food Security Bulletin, supplemented by monthly updates. Similarly, the NEWUs themselves prepare national food security bulletins and also submit relevant ad hoc reports directly to decision makers as required. The type of information usually disseminated through these publications includes: rainfall data and crop conditions; remote sensing images; forecasts of planted areas and production; estimates of food availability and requirements; an annual food balance model; marketing and price information; farm input supplies and services; and household food security.

Rainfall data and crop conditions. This type of information is collected during the crop growing season and includes a record of rainfall levels, crop phenological stages and conditions, and any adverse effects that might compromise production forecasts (e.g., pests and diseases).

Remote sensing images. Remote sensing imagery (CCD and NDVI) is used to support and verify ground observations on crop conditions.

The REWS can also provide information on yield potentials while the crop is in the field. This has been made possible by agro-meteorological maize yield forecasting models the REWS has developed for each country, based on crop water-satisfaction indices.

Forecasts of planted areas and production. Information on crop area and yields is based on statistical surveys conducted during January and April each year using a combination of subjective and objective assessment and measurement

approaches. These forecasts are used for making projections of cereal supplies and possible shortfalls.

Estimates of food availability and requirements. Monthly estimates of cereal supply and demand situations at the national level are made by NEWU agro-economists, based on estimates of cereal stocks (including those held by farmers, traders, millers and the government) and consumption requirements (which are usually related to nutritional status). On the basis of such information, an annual food balance model is prepared on a spreadsheet to facilitate the analysis of the food supply and demand situation in any given SADC country for the current marketing year; this allows comparison with previous years. On the basis of national food balance sheets, a regional balance model is prepared. Monthly food balance models are also prepared that show projected supply and demand over the next twelve months.

Marketing and price information. Following liberalization of markets in most of the SADC member states, the demand for marketing and price information increased. Hence, the REWU and NEWUs started collecting monthly data on imports/exports of grain and market prices (both retail and wholesale) for major cereals and other food crops.

Farm input supplies and services. Assessments of the availability of seed, fertilizers, storage facilities, and credit for inputs and purchase of grains after harvest are made.

Household food security. This information relates to areas, populations, and households affected by or vulnerable to food insecurity.

Strengths and weaknesses of early warning data and information

Strengths

One of the elements central to the success of the 1992 drought relief effort was free exchange of information, particularly early warning. Exchange of information increased the capacity of SADC to coordinate and plan, thereby clearly demonstrating that data and information from the REWS are paramount to the success of any future relief operations. The REWS Food Security Bulletin, backed by national ones, bulletins documented the seasonal changes in weather and food security. It must be said that the early warning system operated very well during the 1992 drought.

Since the 1992 drought experience, the early warning system has also undergone substantial improvement, including

the addition of information on household food security and water resources and markets and prices. Substantial improvement has also been made in the timeliness of delivery of early warning information. The first warnings of the 1991-92 drought were given to SADC ministers in January 1992 (after the onset of the drought). Yet warnings of the forecasted 1997-98 drought were received as early as June (well before the beginning of that season). Furthermore, in Swaziland, the warnings for the impending 1997-98 drought not only were sent out as early as September, but also were packaged to (i) alert farmers to the likely magnitude of impact of the drought on both crops and livestock and (ii) make them aware of the response actions recommended for each agro-ecological zone to mitigate the drought impacts. Hence continued support for the early warning system and strengthening of the institutional and technical capacities of NEWUs so that the information is timely, accurate, and in usable form are clearly warranted.

Weaknesses

Although the early warning system has undergone significant improvement, a number of areas require immediate attention. First, country assessments of food balances need refining. In some countries (e.g., Zambia), changes in demand and supply reflected on balance sheets are not always consistent with corresponding fluctuations in market prices, yet markets are liberalized. Further, the use of nutritional requirement rather than actual consumption in estimating cereal demand is problematic given a multitude of other variables that determine nutritional outcomes.

Second, food security early warning information has historically been generated and disseminated to serve the needs of governments (decision makers). With the changing role of government in ensuring food security, the generation, packaging and dissemination of food security early warning information now needs to be sensitive to the needs of the broad range of new users (e.g., farmers, millers, traders, individuals, etc.). For example, there is now a greater need for long-range interannual forecasting within the region. Apart from assisting farmers (e.g., in deciding on risk management measures like crop insurance), reasonably good long-range forecasts would also assist governments in assessing cultivation plans and formulating crop marketing and appropriate export/import strategies.

Third, more information on the response of farmers to early warning information needs to be collected. Such information would monitor changes in planting patterns and stockholding. This is particularly important given that the sources

(and users) of information on climatic patterns in the region have grown tremendously, especially with the advent of the Internet. With too many sources of information packaged in many different ways, the problem becomes one of interpretation, and it will be impossible to keep track of the type of accuracy of information reaching farmers.

Fourth, greater attention should be paid to the role of hydrological inventories and monitoring mechanisms in early warning information systems. Fluctuations in ground water tables and significant water shortages in reservoirs could provide early signals of the magnitude of the impact of impending drought conditions.

Fifth, one of the areas of contention between governments and NGOs during previous droughts has been the identification and targeting of vulnerable households during relief operations. In many cases governments opted for household targeting while NGOs recommended geographic targeting. This indicates that household-level vulnerability assessments need strengthening. Early warning indicators currently monitored need to be complemented by parameters based more on localized conditions. Already, significant strides have been made in the area of vulnerability mapping by one of the NGOs working in the region. The early warning system can build on that work and make refinements where necessary.

Finally, given the increasing role of trade in food security, information on regional prices and regional markets needs to be added to the list of regional early warning information. The REWS has already started to address some of the above issues. What is needed, however, is institutional capacity building and training to reinforce these initiatives.

SHORT-TERM GOVERNMENT AND NON-GOVERNMENT INTERVENTIONS TO MITIGATE THE IMPACTS OF PAST DROUGHTS

Government interventions

A number of short-term interventions have been used by governments to ameliorate the effects of the most recent droughts. Interventions include food handouts (including child supplementary feeding and school feeding), food-for-work, crop packs, livestock schemes, tillage support and emergency rural and urban water assistance.

Food handouts

Direct food handouts have been the most common type of government intervention throughout SADC. Food handouts

have been in three forms: adult food rations consisting of a combination of maize, pulses, fish and sometimes cooking oil given monthly; daily feeding programs for children under five; and daily feeding programs for school children up to the age of 12 years. The sizes of rations varied from one country to another. In Zimbabwe, maize handouts were distributed at an average of 10 kg per person per month during the 1991-92 drought. These were supplemented with beans and kapenta. Under child supplementary feeding and school feeding programs, mainly protein-rich foods (milk and pulses) were given to avert hunger and malnutrition, although fruits were occasionally part of the diet when available (e.g., in Swaziland, where private companies made such donations). Although this type of intervention has generally been successful in ameliorating hunger and malnutrition, it has often been criticized for creating a dependency syndrome and distorting conditions in local food markets. In some countries, food handouts were received intermittently because of poor coordination between implementing agencies, and many rural households relied on the disposal of assets to survive the severe drought conditions.

Food-for-work

Food-for-work programs have been used extensively in many countries in the region, partly because of their performance in self-targeting. Under such programs, food has been distributed on the basis of work on any identified self-help community project. Some of the projects used during recent droughts have been:

- rehabilitation of eroded lands
- construction of earth dams
- protection of catchment areas
- removal of silt from dams
- improvement of feeder roads
- construction of pit latrines

In Swaziland, each family member earned 400 grams of maize and 30 grams of pulses per day worked during recent drought periods.

Crop packs

Crop packs are a short-term government intervention to rehabilitate smallholder farm families affected by drought. These have also been used extensively in the region and for the last five consecutive years in Zimbabwe. Under this type of assistance, free handouts of inputs (mainly seed, fertilizer and chemicals) have been given to farming families affected by drought. In some countries (e.g., Mauritius), subsidized inputs have been used in place of free handouts. Crops usually covered by crop packs have included maize, cotton, cowpeas,

groundnuts, sunflower, millet and sugar cane. In Zimbabwe, nearly 1,000,000 farm families benefited from free fertilizer, seed and chemicals for at least one hectare of maize and half a hectare of other crops in the 1992-93 season.

The crop pack program, although helping to sustain smallholder output, has a major shortcoming: excessive distribution to farmers who are otherwise capable of buying their own inputs. Another shortcoming has been poor coordination, which not only caused delays in disbursement of crop packs, but also delayed planting and led to problems of accountability. Delays in delivery have often been caused by late disbursement of funds to ministries/organizations responsible for procuring inputs, and this affected delivery of imported inputs, in particular. The program also threatened the viability of businesses run by local agricultural input dealers. Input dealers, fearing that farmers would be provided with adequate "free" packs, were often forced to carry fewer stocks and sometimes insufficient quantities. A lack of distribution warehouses has also been one of the major problems constraining effective distribution of inputs during previous droughts. Finally, crop packs have in the past been criticized for encouraging high-risk production—for example, cultivation of marginal (and fragile) lands, when farmers knew that they would eventually pass on the risk to government.

Livestock schemes

Livestock support schemes have taken a variety of forms, from distribution of free livestock inputs such as mineral licks in Swaziland to construction of permanent livestock holding pens and feedlots for supplementary feeding during critical months in Zimbabwe. In Botswana, livestock relief schemes have normally included free vaccinations, an expanded livestock water development program, ensured availability of livestock feeds and other requisites, and (where feasible) incentives for increased removal of livestock. In Namibia, the government has been subsidizing fodder and licks, karakul pelts, livestock marketing and transportation. The government also purchased farms for emergency grazing purposes.

Some of the main problems that have been encountered with such schemes include insufficient coverage. Farmers living far from the holding pens, for example, fail to bring their livestock because of fear of livestock weight loss during trips. Another problem is that managing large holding pens is difficult. In many areas, livestock support systems were a reactionary rather than proactive measure and often came too late to prevent massive livestock deaths.

Tillage support

In areas where smallholder farmers lost cattle, governments sometimes offered tillage support in the form of subsidized contract ploughing, although it discouraged the development of more sustainable private-sector contract tillage systems in rural areas. Another problem has been that farmers always select the cheaper option, which sometimes comes late in the planting season, causing late planting, low production and continued dependence on government drought relief provisions. It is because of these problems that some countries are reviewing their tillage support programs and changing their approach to providing mechanical tillage as a non-price support mechanism.

Emergency urban and rural water assistance

Water crisis conditions in the past have seen many governments supplementing rural (and urban) water by providing emergency water supplies through mobile water tanks and the construction of boreholes in rural areas. A number of problems, however, were faced under such programs. First, boreholes and water tanks were too few to prevent women from walking long distances to fetch water. Second, the quality (i.e., safety) of water from the tank was not always guaranteed. Third, although construction of boreholes could have constituted a long-term intervention, inadequate planning for the management and maintenance of borehole pumps led to frequent breakdowns or total collapse of some borehole water points. Fourth, because of pressure from the water crisis and the more-or-less ad hoc drilling, some boreholes were drilled where the water table had already fallen, and hence provided water for only a few weeks or months before drying up. In some areas, the number of boreholes and their capacity hardly matched the demand for water for both human and livestock consumption.

Non-government interventions

Non-government interventions include actions of NGOs (e.g., World Vision, the Red Cross, Save the Children Fund), community-based organizations (e.g., churches and farmer development trusts), the private sector (e.g., millers) and individuals (i.e., farmers themselves). Most non-government interventions provided resources to bolster relief programs similar to those of government. For example, many private-sector firms in Swaziland and South Africa donated and distributed food packs to rural areas in recent drought years. Donations from the private sector often included fruits, which were distributed under the child feeding program, dried bread and maize meal. Many NGOs concentrated on food-for-work projects, perhaps because of their self-targeting

advantage. Community-based organizations either assisted in the coordination of government drought relief operations and NGO food-for-work programs or donated food and non-food assistance directly to affected populations.

Because external assistance often was not adequate to meet their consumption needs, individual farmers also employed a number of coping strategies to cushion themselves. Some analysts contend that famine was averted during the extreme conditions of the 1991-92 drought primarily because of individual household coping mechanisms, the major one being the disposal of assets. Many smallholder farmers often found themselves with no choice but to rely on disposal of the few assets in their possession, such as live-stock (both cattle and small ruminants), bicycles, radio sets and some farm implements. However, a major shortcoming of this strategy has been that it leaves these households more vulnerable to future droughts. In many cases, disposal of assets is the last resort. During the early stages of the drought, other methods of coping such as changes in consumption, borrowing food and money, consumption of wild foods, and "distress" employment, are preferred. This means that by the time farm families finally decide to sell assets, the condition of some of the assets, especially livestock, will have deteriorated to the extent that they fetch very low prices, further accelerating their disposal rate. The disposal of productive assets also affects production in the subsequent year, even if it turns out to be a normal rainfall year, thereby trapping farmers in a vicious cycle of low production and low asset holding.

LONG-TERM GOVERNMENT AND NON-GOVERNMENT INTERVENTIONS TO MITIGATE THE IMPACTS OF PAST AND FUTURE DROUGHTS

Government interventions

Interventions by governments to reduce vulnerability and mitigate drought effects have focused on the improvement of urban and rural water supplies, support for smallholder agricultural development, poverty alleviation programs, nutritional programs, environmental conservation programs, maintenance of strategic food reserves, development of alternative energy sources, macro-economic liberalization, and research.

Improvement of urban and rural water supplies

The experience of most countries during recent severe droughts heightened the need to put in place, or accelerate,

urban and rural water development projects. First, there was an urgent need to develop water sources to reduce the impact of drought on agricultural output, employment and food security. Second, water supplies for human consumption were urgently needed to avoid further suffering, especially that faced by women in search of water (and among them, pregnant and lactating women).

This led to an increase in budgetary allocations for water (and sanitation) development projects, with rural areas benefiting the most. In some countries (e.g., Mauritius), droughts highlighted the need to improve water use efficiency. Initiatives to improve water supplies therefore took either of the following forms:

- construction of dams and smaller reservoirs;
- drilling or renovation of boreholes, particularly in the densely populated areas, with increasing attention being paid to their management and maintenance;
- reducing water losses during distribution (e.g., replacing worn-out pipes);
- revision of water rights;
- controlling pollution of surface and ground water supplies;
- rationalization of water tariffs to encourage economic usage;
- promoting more efficient irrigation systems; and localized water harvesting (e.g., installing water tanks along roofs).

Support for small agricultural development

Drought recovery programs for the smallholder sector in some countries have a long-term component. Examples are the live-stock water development program of Botswana and the female calf-heifer loan scheme in Zimbabwe, which includes medication and veterinary services and also risk insurance. Under the Zimbabwe program, the government will loan a calf-heifer to a smallholder farmer. The farmer raises the calf and sells its offspring to repay the debt into a self-generating revolving fund. In some countries, recent drought experience has accelerated smallholder irrigation development, the emphasis being on guaranteeing food security and ensuring income growth through crop diversification.

Poverty alleviation programs

Various initiatives have been started in many countries to tackle poverty. Considerable progress has been made and some countries now have poverty alleviation action plans drawn up. However, progress in the implementation of these plans has been much slower. Other countries have various statements toward this end, defined in a fragmented manner in either national development plans or other policy state-

ments or documents. Major impediments to implementation have been (i) the lack of capacities (institutional, technical, and information) at the national level to define, map and target the vulnerable and (ii) mobilizing the large amounts of human and financial resources required. Some countries have only completed poverty assessments.

Nutritional programs

Nutritional education and training programs are being implemented in some countries (e.g., Tanzania) as a long-term measure for reducing drought effects. More knowledge about diets, food preparation, storage and preservation are key to optimal use of otherwise scarce food resources during drought years. In some countries, nutrition surveillance and monitoring have been stepped up to keep policy makers abreast of dynamic changes in the level of vulnerability.

Environmental conservation programs

Recent drought experiences in Lesotho have highlighted the importance of environmental conservation in mitigating the impact of droughts. Although the 1991-92 drought was of a lesser magnitude (in terms of rain deficiency) than the one Lesotho experienced in 1982-83, the impact of the more recent drought was more devastating than that of the 1982-83 drought because of land degradation that occurred in the interim period. Some countries in the region have also realized this and have embarked on programs to reduce the impacts of future droughts through better environmental conservation.

Maintenance of strategic reserves

Maintenance of a financial reserve facility to complement a physical strategic grain reserve has become a popular longer-term risk management measure in some countries in the region. Although physical stocks are critical to ensuring that the transition to grain imports is done smoothly and that markets are cushioned,³ physical stocks remain only a short-term measure. For long-term risk reduction, maintenance of a financial facility that earns interest in normal years that can be carried over into the following year has become the much-preferred option. Hence many countries have recently been keeping only 3-4 months of consumption requirements as physical stocks whilst the rest of the strategic grain reserve has been kept as a financial facility.

Development of alternative sources of energy

The impact of power shortages and electricity rationing on the economy during recent drought episodes has encouraged some countries to urgently look into alternative sources of energy to reduce the impact of future droughts. In

Tanzania, for example, the drought that affected the unimodal regions of the Southern Highlands in 1997 led to power rationing, with consumers sometimes going more than 18 hours a day without electricity. Hence the country has now been focussing more on the Songo Gas Project and the Kiwirra Coal Mines as alternative sources of power.

Macro-economic liberalization

Most SADC countries have embarked on macro-economic adjustment programs that are aimed at restoring their economies to the growth path by encouraging greater efficiency in use of scarce resources. In their various forms, most adjustment programs have specific measures for promoting investment, employment generation and income growth in the long run and, if successful, could add to the long list of measures for reducing the region's vulnerability to future droughts.

Research

Many governments in the region are also reexamining the role water-saving technologies can play in alleviating drought-related water shortages. In some countries (e.g., Mauritius), research into alternative irrigation systems and more drought tolerant-crop varieties (e.g., for sugar cane) is being reinforced as a long-term strategy for drought mitigation.

Non-government interventions

The most common type of long-term non-government intervention to mitigate drought effects has been risk insurance, which farmers have increasingly relied on, particularly those in the large-scale sector. Another area of interest to the private sector is research into water-saving technologies (both in terms of irrigation systems and crop varieties).

Primary constraints to achieving a higher level of drought preparedness

Although all countries have put in place fairly high-level drought/disaster management committees or task forces in preparation for any impending disaster/drought, one of the greatest limitations in reaching a higher level of preparedness throughout SADC appears to be the absence of clear policy guidelines on drought management. Only Namibia has formulated a policy on drought; Mauritius has a drought action plan. Other countries do not as yet have clear policy statements. The absence of a clear policy and the negative implications on the ability of a country to cope with droughts are clearly and widely acknowledged in the case of Swaziland.

The second major constraint experienced during recent droughts, which can be anticipated when policy guidelines

are not explicit, has been lack of coordination between departments managing drought, at both national and local government levels. In some cases, this was aggravated by failure to engage other important factors in drought management (e.g., NGOs, CBOs) and poor planning. In some cases, the conventional wisdom that drought is a food shortage problem alone has led to the exclusion of other important sectors such as health and water. Although many countries are revising representation in their national drought committees, optimal representation of community-based groups, the affected population, and other important sectors in those structures is yet to be achieved.

A key concern to many countries has been the inadequacy of information at the household level, especially that which can be used to isolate and track population groups most at risk. Of particular concern has been the general weakness of household vulnerability assessments throughout the region. A general exclusion of community involvement in vulnerability assessments and tracking partially explains this weakness. The weakness of household vulnerability assessment could be explained by a general lack of expertise and capacity in this area.

Another area of concern has been the inadequate exchange of information between national structures, reshuffling of various departments, and high staff turnover at the national through local level. Perhaps what is needed in the future are structures that accommodate such changes to maintain consistency in representation and continuity in such development efforts. Lessons learnt in previous droughts should be carried forward to provide input into future development planning.

RECOMMENDATIONS

From the foregoing discussion it is clear that drought is, and will continue to be, a fact of life in the region. The SADC region has made significant strides toward achieving a higher level of preparedness. Lessons from previous droughts continue to provide valuable input into planning for and managing future droughts. However, greater focus should now be on the following:

- reaching a consensus on a drought policy at regional and national levels;
- placing greater emphasis on long-term vulnerability reduction rather than short-term mitigation measures;
- ensuring that short-term drought mitigation measures support longer-term development objectives;
- broadening the scope of the drought response beyond food security;
- broadening participation of relevant actors in drought

- planning and management;
- building institutional capacity for coordination of drought programs;
- strengthening the capacity of the early warning system to enable it to meet the demands of a dynamic socio-economic and political environment;
- building capacity for vulnerability assessments and mapping; and
- building regional capacity for long-term (interannual) forecasting.

ENDNOTES

- 1- (page 39) The only exception is South Africa, which experienced a much worse drought in 1932-33.
- 2- (page 42) Available literature shows that only Namibia has an explicit drought policy. In other countries, there is either no policy or the policy is loosely defined in several documents, including policy positions articulated in the various national development or disaster plans, and cannot be traced to a single policy document adopted by government. However, a lot of national initiatives toward formulating a formal policy on drought are being implemented.
- 3- (page 48) For example, during the 1992 drought, the government of Botswana released 20,000 mt of SGR (sorghum and maize) into commercial stocks, greatly assisting the private sector in re-establishing itself and preventing the otherwise impending price hikes.

INTRODUCTION

Aware of the serious impact of drought in the African continent and taking note of the provisions made in the United Nations Convention to Combat Desertification (UNCCD), UNSO undertook an inventory of the status of drought preparedness and mitigation (DPM) in Africa and requested the IGAD Secretariat to participate in the exercise covering the IGAD sub-region. The Secretariat agreed to the request and a regional consultant was recruited to undertake the exercise.

Terms of reference

The goal of this exercise was to assess existing policies and strategies for drought preparedness with overall national development planning processes and other sectoral policies particularly water and assess the extent to which such existing DPM policies have been effective in handling past drought episodes. Specifically, the exercise involved the following:

- Detail the Institutional mechanisms in place to prepare for response to the effects of drought, including:
- Existing contingency planning processes/mechanisms; Institutional mechanisms at regional, national and sub-national levels;
- Nature and types of early warning systems in place.
- Inventory the actions of the key actors in DPM, including bilateral/multilateral donors, NGOs, sub-regional organizations, etc., and identify gaps in research for potential follow-up after the assessment.

Objectives of the review/assessment

To provide input for the formulation of concrete actions at both national and sub-regional levels to tackle the acute problems associated with recurrent drought, which constitutes a major impediment to food security.

Expected outputs from the inventory/review:

A detailed overview, from a sub-regional and country perspective, of the status of drought preparedness and mitigation, identifying the constraints to effective DPM; A succinct report summarizing the activities of the main bilateral and multilateral donors in these countries, as well as those of any other actors (e.g., sub-regional organizations, international NGOs, etc.); and, Where possible, a summary description of local coping strategies and mechanisms of vulnerable populations including an outline of appropriate activities to reinforce and support these strategies, with the aim of linking local mechanisms to sub-national and national levels.

Methodology of assessment

This report is a review and synthesis of various documents available in the IGAD Secretariat, the IGAD Member States (MS), national consultants' reports on disaster preparedness strategy in the IGAD sub-region, other sources and discussions with relevant professionals in the MS. This inventory was undertaken at the end of 1997.

The review has some limitations. It was easy to get information on drought events, but in some cases it was not possible to get facts and figures. This partly reflects the absence of post drought assessment and documentation.

The guidelines provided by UNSO, with slight modifications by the consultant, was used to prepare this report. The report starts by reviewing from the literature, the definition of "drought, followed by an overview of the sub-region, focussing on cross-cutting factors contributing to drought vulnerability and implications for drought preparedness policy and planning formulation. Then it presents analysis of the key issues in drought management in the sub-region as a whole, with examples from the countries wherever information is available.

The review focuses on existing drought management mechanisms, actions, and constraints at sub-regional, national and sub-national levels rather than on drought definition.

DEFINITION OF DROUGHT

The nature of drought is still not well understood, and there is no single universally accepted definition of drought. Many people have defined it in various ways (Houman et al., 1975; Subramanyam, 1967; AppaRao, 1985, 1986; WMO, 1975). Generally, "drought could be seen as a period of extreme dryness due to lack of sufficient water: (NMSA-E, 1996). However, for operational purposes, it could be defined as meteorological, agricultural, hydrological, or social economic in nature.

Meteorological drought refers to a reduction in rainfall measured against national or regional norms established over a number of years. The Southern Oscillation Index and the El Niño period are useful indexes to predict emerging drought conditions. "Among the various definitions of drought, the meteorological drought is important as it leads to other kinds of drought if it persists for a long period over a wide area" (NMSA-E, 1996).

Agricultural drought refers to insufficient moisture to maintain plant growth and survival, leading to a decrease in crop yield. The indicators are usually NDVI, rainfall patterns, observation of crop performance from establishment to harvesting, and the condition of pasture in pastoral areas. [Soil moisture is the key indicator of agriculture drought.]

Hydrological drought is a reduction in surface and sub-surface water supplies. Key indicators are lakes, and reservoirs levels, streamflow, ground water levels, and snow pack. Shortages in one or more of these components of the hydro-ponic system result in impacts in many sectors, including agriculture, transportation, energy and recreation. Drought could also be defined on the basis of its consequences for the economy and social activity. These consequences include dysfunction of the economic sector and adverse impacts on or constraints to human activity.

THE IGAD SUB-REGION

Overview

The Horn of Africa is now referred to as "the IGAD sub-region" after the establishment of the Inter-governmental Authority for Drought and Development (IGADD). It constitutes the nations of Djibouti, Eritrea (joined in 1993), Ethiopia, Kenya, Somalia, Sudan and Uganda and covers an area of 5.2 million sq. km. Arid and semi-arid landscapes cover 80% of the region, which receives less than 400 mm of rainfall annually (IGAD, 1997). The population is estimated to be 145 million (IGAD, 1997), with an average growth rate of 2.5-2.9%. The population density varies from 9.4 inhabitants/sq. km in Somalia to about 67 inhabitants/sq. km in Uganda, with considerable variation. (IGAD, 1993). More than 75% of the population lives in rural areas dependent on subsistence rain fed agriculture. Agriculture is not only the source of livelihood for the majority of the population, but also accounts for 40-50% of the GDP for all the MS, with the exception of Djibouti, which is not an agricultural country.

The countries of the sub-region share many common characteristics that contribute to drought vulnerability, such as the arid and semi-arid nature of the climate, desertification, drought frequency, conflicts, population pressure, dispersion of settlements, nomadism, unemployment, and low levels of awareness of drought preparedness. All, without exception, are among the world's poorest countries. Their infrastructure and institutional arrangements are generally weak, but this varies greatly between countries, from relatively better in Kenya and Sudan to very weak in Djibouti. Although there is intra- and

intercountry variation in the land tenure systems, generally they are not conducive to long-term private investment.

With respect to food security, the annual cereal requirement for the IGAD countries is about 21 million tonnes (MT) (IGAD/FSR, 1996), although this varies greatly from year to year. For example, in 1996, it was 19 MT, and the food aid requirement was about 355,000 tons (FAO/GIEWS-AR, Nov. 1997). The total import requirement, including food aid (excluding exports), for 1997 was more than 1.8 MT (FAO/GIEWS-AR, June 1997). In general, the food supply situation has not shown any improvement, and in fact it has deteriorated. It is estimated that the food supply in the sub-region has reduced by 16% between 1980 and 1993 (USAID). Agricultural productivity has not shown any improvement. At an aggregate level, Sudan and Uganda could be considered as food sufficient. The rest of the countries are food deficient (Djibouti 100%, Ethiopia about 50%, Eritrea 60%). Household food security will not be achieved in the foreseeable future.

The rate of undernutrition is very high. The rate of stunting is estimated to be 45% in Ethiopia, 31.6% in Kenya and 31.8% in Uganda (Kedir, 1997) and 37% in Somalia (FAO/IGAD, 1998). The average calorie intake is about 1,950 Kcal, which is far below the internationally recommended norm of 2,100 Kcal for survival and 2,400 Kcal for an adequate diet (Kedir, 1997). Therefore, due to these and other factors, the sub-region has suffered from recurrent drought, with serious social and economic impacts.

The establishment of IGAD

The worst drought events which hit the sub-region between 1973/74 and 1984/85 and resulted in millions of people suffering from food shortages and famine. This prompted the countries of the "Horn" to establish the Inter-governmental Authority for Drought and Development (IGADD) in 1986. The main objective of the organization was to coordinate sub-regional actions to combat drought and desertification, promote development, and mobilize resources (IGADD, 1986).

In 1996, a decade after its establishment, the organization was revitalized and renamed the Inter-governmental Authority on Development (IGAD) with the understanding that the enhancement of overall development approach is the ultimate solution to the problems of drought and desertification. Accordingly, its charter was amended and an additional task of conflict prevention and resolution included in

its mandate with the realization that there can not be meaningful development initiatives without peace and stability in the sub-region. The central focus of the newly revitalized IGAD is "Development" with three inter-linked priority areas of action: Food Security and Environment, Infrastructure Development, and Conflict Prevention and Resolution (IGAD, 1996). These three inter-linked areas address the issue of sustainable development, and hence, contribute directly to drought mitigation.

DROUGHT PROFILE

Magnitude and Impact

Drought is not a new phenomenon. It is part of the climate and so it behaves likewise. Drought has persisted in the sub-region for hundreds of years. Ethiopian chronicles date it back to the 253 B.C. (Tedla, 1997; NMSA, 1996). But, it was only since the 1970s that it drew the attention of governments and the international community. The magnitude and impact is not new either. The establishment of IGADD as stated earlier, is by itself sufficient evidence to portray the seriousness of the problem of drought in the sub-region.

Drought is not a sudden event. It is something expected to happen in small or large scale at any one given year. So, while the occurrence of drought may be inevitable, it is possible to minimize the impact and mitigate its effect through appropriate and coordinate preparedness and mitigation measures.

Drought is believed to have a cycle of occurrence. For example, in Kenya, from observations made over many years, severe drought could be expected to occur every 25-30 years, medium every 5-7 years, and minor every 3-5 years (Gachara, 1997). In Djibouti, Eritrea and Ethiopia it is observed to have a 9-10 year cycle (NMSA-E, 1996; Michael, 1997) and in Somalia every 5-7 years (Farah, 1997).

Although localized drought spells have always existed, in the last two decades the sub-region has witnessed some of the worst widespread drought episodes (e.g., 1973/74, 1984/85, 1992). The causes have been associated with El Niño. Every country in the sub-region was affected with heavy human, livestock and crop losses. In Ethiopia, 8.7 million people were affected in 1984 with serious food shortages and famine. More than one million people died, 1.5 million livestock perished and more than 10 MT of crops were destroyed. Similarly, in Sudan, 8.5 million people were affected, of whom about 2.4 million suffered from severe famine. The number of deaths was estimated to be a million and livestock deaths more than seven million. Crop

production levels fell by one-quarter of the requirement (Wahab, 1997). Migration was high in both countries. Kenya was severely affected and Somalia moderately affected (unlike the 1974/75 drought). Djibouti was one of the worst hit, with very high social and economic impacts especially among the nomadic population.

A review of drought occurrence in more recent years indicated that there have been small- and large-scale drought spells through out the region from 1987 to 1997. In 1987, about 2 million people in Sudan, more than 5.2 million in Ethiopia (RRC, 1987), some one million in Eritrea and about 200,000 in Somalia were severely affected. The total crop loss was estimated 15 MT.

For most countries, 1992 and 1994 were severe drought years as well. In 1992, Kenya, Djibouti and Somalia were severely affected. In 1997, more than 4 million people in Ethiopia were affected and required some 350,000 MT of food aid. Similarly, in Somalia about 200,000 people were in need of food aid because of drought. Kenya had a bad year in 1996, with most of its districts affected. Heavy livestock losses were reported and relief food was distributed. Maize was imported from neighbouring Ethiopia. The drought also continued for some months in 1997 (Gachara, 1997).

It is worth noting that drought continues to be a serious threat. In recent years the frequency of drought has increased. Droughts may have increased in duration because the rains have become more erratic and unreliable. However, the impact has been reduced. We no longer witness the horrible scene of mass migration, starvation, and deaths in the millions as occurred in 1984. This is because of a growing awareness, relatively better response, and improved coping experience. On the other hand, response resources are dwindling because of inflation and reductions in food aid packages. This indicates the need for better preparedness and concerted action to lessen the effects of drought.

Impact of Drought

The social, economic and environmental impact of drought in the sub-region has been very serious. One of the features of drought is that each occurrence increases social and economic vulnerability. Drought impacts are the result of the lingering effects of previous droughts coupled with more recent drought events. Data is generally inadequate to quantitatively assess the social, economic and environmental impact of drought in recent years. However, from the experiences of the last 20 years, some inferences could be made.

Social Impact

Whenever and wherever drought occurs, it has caused food shortages that have led to increases in food prices. These food prices quickly exceeded the purchasing power of the majority of households, which are already resource-poor with little or no access to other forms of income. Inadequate nutrition resulted in high rates of malnutrition and associated morbidity and mortality effects. This has been the experience with every drought in every country in the IGAD region.

The water supply situation in the sub-region, especially in the Arid and Semi Arid Lands (ASALS) is deplorable, and any drought spell further aggravates the situation. Even at normal times, people have to walk long distances to fetch water — usually a women's job, and therefore they suffer most. In times of drought the situation becomes worse. Water scarcity leads to serious social and economic impact. Take the case of the nomadic pastoralists. When drought occurs, water becomes scarce and the condition of pasture deteriorates. Generally there is a change in the terms of trade between livestock and grain in favour of the latter. Livestock are sold at very cheap price before they die, and the food prices at that time are usually high because crops also fail because of shortage of rain. For example, in the eastern part of Ethiopia in 1997, drought conditions were so severe that water for human and animal consumption had to be transported more than 50 km by trucks and distributed to urban and rural areas (DPPC, 1997). It is not hard to imagine how difficult such operation could be logistically and financially. This part of Ethiopia is not an agricultural region, so food prices were high even in normal times. With the drought, prices doubled. The only solution was food aid, which was neither timely nor adequate. Under such conditions the nomadic pastoralists had no other choices but to sell their livestock at very low price before they die. The result was that the people became more vulnerable to subsequent drought spells because they lost part of their livestock.

Tribal clashes flare up among the pastoralists within national boundaries and across borders as they compete for water and pasture during migration, result in loss of lives and massive cattle rustling. Many incidents of this kind have been reported in Djibouti, Ethiopia, Kenya, Somalia and Uganda.

Economic Impact

In countries that are poor, as in the IGAD sub-region, it is clear that any drought disrupts the national and local economy. Countries are forced to shift their budgets toward relief efforts to save lives, thus affecting development activities that

could mitigate the effects of drought in the long term. The meagre foreign currency reserve is used for purchasing food, mostly from outside and usually at a very high cost, further hampering the economy. Water and power rationing, a result of lowered reservoir water levels dams has been common since the 1992 drought (Kenya, Ethiopia, Sudan, Eritrea). Some countries like Kenya, which earn a lot of income from tourism, could as well be affected if the wildlife is affected by drought. This was observed to some extent in 1984, 1987 and 1992. Figures for recent years were not available to analyze the effect of drought on GDP.

Environmental Impact

During drought, an already degraded and desertified environment is further aggravated, indirectly as well as directly. When drought occurs, trees dry and leaves wither, thus causing changes in ecosystem and climatic imbalances. In times of drought, the environment is even more affected, both directly and indirectly, through human activity. Where there is drought, food shortage occur and food prices increase. Therefore, people look for every opportunity to survive the worst, and one of the ways they cope is cut trees for firewood and charcoal to sell. The environment is also affected indirectly by lack of attention, because most environmental rehabilitation activities halt as people go hunting for food for survival, especially if there is no food aid. Resources normally allocated for environmental protection by governments are channelled toward relief.

Livestock, which depend on the environment during normal climatic years, can also contribute to its destruction in times of drought by over-grazing and causing physical damage. First, when pasture becomes scarce, they resort to digging the roots of small vegetation and interfere with the natural vegetative process. Second, there is massive movement of livestock over long distances in search of water and pasture. During the migration of livestock, they destroy trees and seedlings. These migrations are common practice for groups like the Borena in Ethiopia, the Massai and Turkana in Kenya and the Kebabish pastoralists in Kordofan and Darfur in Sudan. In the absence of proper rangelands management practices and lack of appropriate land use planning and policies, the environment will continue to suffer such destruction, causing further vulnerability to drought.

VULNERABLE AREAS, ECONOMIC SECTORS AND POPULATION GROUPS

The entire sub-region could be considered vulnerable to drought, but the most vulnerable areas are the arid and semi-arid zones. These receive less than 400 mm of rainfall

annual. This includes the degraded highland areas. The most drought vulnerable areas in the sub-region are given below.

Country	Vulnerable area
Djibouti	The whole country
Eritrea	The whole country
Ethiopia	Northern and central highlands and the eastern and southern lowlands
Kenya	The whole of the ASALs and the north
Sudan	Western, central and eastern
Uganda	North and northwest

The economic sectors most affected are agricultural and livestock production, which support more than 80% of the population and account for 40-50% of the GDP. The population groups that suffer most are those that depend wholly on these economic sectors: nomadic pastoralists, agriculturalists, agro-pastoralists, agricultural labourers, the landless, and the urban poor. These groups have a weak resource base and low purchasing power. At the household level, women, children and the elderly are affected most because they usually stay at home as the male adult members migrate in search of labor. This has been observed in many drought situations in the sub-region.

COPING MECHANISMS OF POPULATIONS

In-depth knowledge of coping mechanisms of households/communities living in the drought-prone areas is essential for disaster/drought preparedness planning and response. However, coping mechanisms differs between individuals, households and communities. Coping is dictated by time, place, person and condition. Every episode of drought leads to improvement/change in coping mechanisms. Thus, coping is a dynamic process. Therefore, it has not been possible to comprehensively document the coping mechanisms of populations. Considerable research needs to be done on this topic.

Coping mechanisms can be divided into two stages: Short-term coping, which is a survival mechanism, and long-term coping, which involves changing lifestyles and production systems.

Short-term coping mechanisms

Since the 1970s, there has been a growing interest in documenting coping strategies of communities affected by drought. Most of the studies in the sub-region came from Ethiopia and Sudan (Cobet, 1988; Rahmeto, 1987; De Waal, 1987; SCF-UK, 1997). Coping starts with traditional practices such as seeking refuge with better-off relatives, borrowing from relatives, bartering, selling less useful animals. As the situation gets worse, the coping mechanisms also change to include practices such as:

- Change in consumption patterns; shift to poorer quality, lower-priced foods; decrease in the number of meals and quantity of servings.
- Compensation with wild foods not normally edible.
- Migration of some family members in search of labor, pasture and water for their livestock.
- Further sale of animals and household assets.
- Destitute migration.
- Full dependence on food aid.

Long-term coping strategies

Long-term coping strategies developed over the years differ from short-term survival mechanisms. They include:

- Change of food habits, changing staple foods.
- Diversification of livestock and crops.
- Changing production systems (e.g., intercropping, introduction of new varieties, shift to cash-generating crops and vegetables).
- Diversification of income, wider income venues.
- Change in strategies to acquire and store food with the anticipation of drought.

POLICY AND PLANNING FOR DROUGHT PREPAREDNESS

Governments have responded to drought by crisis management rather than risk management. Every country has some form of system for drought response which is activated during times of crisis. The governments of the sub-region are fully aware of the need for drought policy and planning, but so far only Ethiopia has developed a comprehensive plan (details below). Eritrea and Uganda have been provided with funds from UNDP to formulate disaster/drought policy and contingency planning, but action has not been taken yet because of lack of experience and qualified manpower. Kenya is considering formulating a drought policy and plan in the near future. The role of sub-regional organizations like IGAD is vital in such situations to encourage and provide technical assistance to countries.

In the long term, drought mitigation has become inherent in the overall and sectoral plans and programs that every country has developed. This is in recognition of the fact that the ultimate solution to the problems of drought and decertification is sustainable development and that all development plans and programs should directly contribute to drought mitigation.

ORGANIZATIONAL STRUCTURES AND INSTITUTIONAL ARRANGEMENTS FOR DROUGHT PREPAREDNESS

All countries of the sub-region have identified lead institutions to deal with disaster/drought response coordination. The existence of multi-sectoral committees at various levels is also common in all countries. But generally they are technically and financially ill-equipped, so most of the committees have been limited to crises management with very few or no contingency plans and planning processes in place. The mechanism linking the national to sub-national committees is not strong and often not adhered to, especially in times of crisis management. There are some exceptions, as indicated below.

In the case of Djibouti, there are two inter-ministerial committees at the national level. The first is chaired by the Ministry of Interior and is responsible for all sorts of disasters. The second is under the Prime Minister's office and is mainly responsible for drought. The latter has a Technical Advisory Committee chaired by the Ministry of Agriculture (MoA). The committees function in the event of crises only (Djama, 1995).

Eritrea has a national Inter-ministerial Steering Committee (NISC) for Early Warning (EW) chaired by the MoA with a technical multi-sectoral sub committee. The NISC is responsible for agency coordination and the sub-committee is responsible for the coordination of the timely collection and dissemination of early warning information. Another important national committee is the Food Security Reserve Committee (FRC), chaired by the Eritrean Grain Board (EGB) with members from key relevant government agencies. The main task of this committee is to organize food stores in strategic locations prone to drought, stocking food from all possible sources at all times, coordination of market information, and stabilization of food prices, especially in times of severe food shortages. The fragile food supply and the persistence of drought in the country has forced the committees to be very vigilant and active at all times, with very frequent and regular meetings. The Eritrean Relief and Refugee Commission (ERREC) is the lead agency for coordinating relief, settlement and reintegration programs for dis-

placed persons, returnees, and demobilized fighters. It is also responsible for the coordination of the work and inputs of NGOs in collaboration with sectoral ministries.

Ethiopia is the only country in the sub-region with a comprehensive drought policy and contingency planning that has legislative support and a decentralized institutional arrangement for coordination (TGE, 1993). This is in line with the government's decentralization policy, based on its federal system of government. The policy was ratified in 1993, put into effect in 1996, and tested during the drought of 1997.

The Disaster Prevention and Preparedness Commission (DPPC), formerly the Relief and Rehabilitation Commission (RRC), is the lead agency for all disaster/drought prevention and preparedness matters in the country. It is supported by various committees at the national and the sub-national levels.

At the national level, there are two committees. The first is the National Committee for Disaster Prevention and Preparedness (NDPPC), chaired by the Deputy Prime Minister, with members from all relevant government ministries and commissions. With DPPC as its secretariat, the NDPPC has the mandate to oversee and enforce the implementation of the policy. The second is the National Early Warning Committee (NEWC), chaired by the DPPC, with members from relevant government agencies, UN bodies and NGOs. The Secretary to this committee is the head of the National Early Warning Department of the DPPC. Similar committees also exist down the administrative hierarchy at the sub-national levels. Their functions are to coordinate the collection of EW data and, based on analysis, provide suggestions for action. The NEWC also has an advisory role to the NEWU. The sub-national steering committees are chaired by the highest official at their respective levels. The roles of all stakeholders at all levels have been identified and clearly stated in the document.

The Employment Generation Scheme (EGS) is the tool for the implementation of the policy and plans (DPPC, 1997). Priority is given to drought-prone areas and the poorest of the poor population groups to participate in the scheme. The activities to be supported include preparedness, response and mitigation. A proactive financial and material resource mobilization strategy has also been developed to enhance the implementation.

Implementation of the policy and plan

Nine technical ad hoc inter-agency task forces from all

stakeholders were established to work on the following areas to help implement the national policy:

- Employment Generation Scheme (EGS)
- Sensitization and training
- Capacity building
- Early warning system
- Logistics and transport
- Management information system
- National Disaster Prevention and Preparedness Fund
- Displaced persons and returnees

As the components of the policy and the plans became more and more institutionalized at the national and sub-national levels, the task groups were gradually reduced in number.

Efforts have been made to popularize the policy and plans through series of awareness and sensitization seminars at various levels. Operational guidelines and training manuals have been produced for the EGS, EWIS and other groups (DPPC, 1997). A vulnerability assessment profile was prepared following a workshop involving all stakeholders in 1997. Training programs have been conducted for professionals and extension workers and other civil servants at the sub-national levels. Training has been taken as a continuous process, and so long as funds are available, it continues to be provided. It should be noted that although the system has been implemented many challenges still lie ahead to make it efficient and effective. But, whatever the case may be, it is a move in the right direction for a country that has been under emergency relief through crisis management for almost three decades. (All documents are available in hard copy if required).

In Kenya, the Disaster Management Unit in the Office of the President is responsible for drought preparedness coordination, supported by the National Disaster Relief Committee (NRDC). The NRDC's major role is to mobilize internal and external resources and coordinate relief distribution. A committee for food security and early warning was established in 1983 entrusted with providing timely information for decision makers. But it has not been effective, and later another Early Warning Unit was created in the MoA. That unit has also remained dormant. Famine Relief Committees do exist at the sub-national levels, but they are activated only in times of crisis, as the name implies. A plan to establish Drought Contingency Committee proposed after the 1992 drought but has not materialized to date (FAO/IGAD, 1994, Gachara, 1997). After the worst drought in Kenya in recent years (1992), the government has been implementing the "Drought Recovery Project", currently renamed "Arid

Land Resources Management Project" in Samburu district including the ASALs, coordinated from the Office of the President. The program package consists of many drought rehabilitation and mitigation activities with a built-in EWS. Data generated at that level are sent to the Office of the President in Nairobi for analysis. The reason given is lack of technical capacity at that level. There is also another project, the Drought Contingency Planning Unit, that was implemented some years ago in Turkana district. It is especially designed to help nomadic pastoralists recover from the effects of drought. It has various activities related to the production system of the nomadic population. Locally, the projects have been effective, and it is hoped that the experiences from these projects will be used to develop national drought policy and contingency planning. Generally, the relief coordination from the Office of the President in times of crises seems to have been effective. But, there is no contingency planning at other times. The agency coordination and consultation and the linkages between the national and sub-national levels appear to be weak. The disaster relief management system is highly centralized at the highest office in the country — the Office of the President. The danger is that it gives little room for wider participation and could prohibit the capacity-building and empowerment of the lower levels in drought preparedness and mitigation.

The case of Somalia is different. In the absence of a legitimate government in the country, it is hard to expect any drought policy nor meaningful coordination. However, UN agencies (WFP, FAO, UNICEF, UNDP), multilateral agencies and NGOs, in consultation with clan leaders, are implementing programs that contribute directly or indirectly to drought preparedness, response and mitigation. In Sudan, three bodies are responsible for disaster management often with overlapping roles. The first two are the Humanitarian Aid Commission (HAC) — formerly the Relief and Rehabilitation Commission (RRC), and the Council for Civil Defense chaired by the Federal Minister of Internal Affairs. The complex emergencies in which HAC plays a key role are handled under special arrangement. The third committee is the National Committee for International Decade for Natural Disasters Reduction (IDNDR), established to follow up the implementation of the IDNDR declaration, but it is inactive. Other than these three, there are 23 committees, including the early warning committee at various levels, but they are not always active (Wahab, 1997). In addition to the above three committees, the National Drought and Decertification Unit (NDDU) in the Ministry of Natural Resources is responsible for the coordination of the UNCCD and also has a subsidiary role in drought mitigation issues.

In Uganda, disaster/drought management is shared between the Office of the Prime Minister and the Ministry of labor and Social Welfare, which has a Department of Disaster Management. Action starts when there is a crises. In reality, there is no clearly defined coordination mechanism for disaster/drought in the country. Many agencies are involved with no coordinating mechanism, possibly because drought effects are not as pronounced in Uganda as in the other countries. Funds allocated from UNDP for the formulation of disaster preparedness strategy has not been utilized.

OPERATIONAL ASPECTS OF DROUGHT MANAGEMENT

Regional Early Warning System (REWS)

Information is the backbone for drought preparedness and response. It is hard to achieve efficient drought management without efficient and reliable EWS in place. Unfortunately, the attention given to information systems by governments and donors alike is generally low.

Since its establishment, IGAD had fully recognized the importance of EWS and the weaknesses in the MS. In its efforts to develop REWS and assist the countries, IGAD was able to secure funds, and since 1990 it has been implementing the REWS with funds from the government of Italy, executed by FAO. Through its REW project, IGAD has provided a lot of technical, financial and material support for the development and strengthening of the National Early Warning Systems (NEWS). Various types of training were given on EW data analysis, and several workshops were conducted to exchange experiences and for consultation purposes. Methodology guidelines were developed, and regional and national databases established. Vehicles, computers, and meteorological and communication equipment were provided and support was given for office materials. When the project came to an end in 1995, IGAD in collaboration with FAO, developed 7 national and one regional project proposals for further assistance to consolidate the efforts made. IGAD managed to secure funds only to support the newly established EWS in Eritrea and the Regional Marketing Information component from the government of Italy through FAO. Currently, IGAD, in collaboration with USAID and the Italian Cooperation, is developing a "Regional Integrated Information System (RIIS)" which will initially incorporate disaster early warning, food, and environment and resource information. In addition, IGAD has finalized arrangements for the implementation of an EU-financed regional project, Strengthening Remote Sensing

Application for Environment and Food Security. The regional project will be coordinated by the Drought Monitoring Centre (DMC) at the Kenya Meteorological Department (KMD) in Nairobi. The project is expected to improve the capacity of national meteorological services to collect, analyze and disseminate meteorological information, which are crucial indicators for early detection of drought.

Status of the NEWS

Although many efforts have been made by IGAD to develop and strengthen National Early Warning Systems (NEWS), its ability to produce and disseminate quality and "timely" information is still far below expectation.

The EWS in the Member States of IGAD (MS) is not well developed. Djibouti and Kenya do not have functional EWS. The EWS in Sudan and Uganda have not shown much improvement in efficiency. The EWS in Eritrea has made a promising start. The EWS in Ethiopia, one of the oldest in Africa, is more advanced and decentralized at the sub-district levels as defined by the drought preparedness policy.

The meteorological components are better in most countries, except Djibouti. It has only one functioning meteorological station. Ethiopia and Kenya have advanced systems with reasonable network coverage and information exchange. Eritrea has done very well in the last two years. It has expanded its meteorological network to cover almost the entire country. Sudan has done well in this area also, but their meteorological network and data do not match the country's size, high agricultural potential, or magnitude of drought problems. Uganda has shown some improvement both in meteorological station coverage and quality of information output. The weakest part of the meteorological component in all countries is the inadequate meteorological stations coverage of the ASALs.

Data/information collected by the NEWUs

The data collected by the NEWUs with functioning EWS are similar, with variations in coverage and quality. They include:

Agro-meteorological:

Frequency: Regular, output decadal

Source: Meteorological Departments through their network

Rainfall, temperature, soil moisture

Weather forecast

Water level of main rivers

Remote sensing:

Frequency: Very irregular due to inability to process data
Source: Remote Sensing Center (Nairobi), FEWS, GIEWS, others

NDVI (images and indices)
CCD (images)

Agro-economic:

Frequency: Regular and seasonal (cropping season)
Source: MoA through its extension services and grain marketing agencies

- Prices of main staples
- Prices of livestock
- Terms of trade: Livestock/grain
- Food Supply situation: Stocks, imports/exports

Other agricultural and livestock performance:

Frequency: Regular and seasonal (especially cropping season)
Source: MoA through their extension services

- Crop performance from establishment to harvesting
- Area under cultivation
- Cropping pattern
- Crop production estimates
- Pest infestation
- Prices and supplies of agricultural and other related commodities
- Pasture and water condition
- Livestock physical condition and diseases

Socio-economic conditions:

Source: MoA, MoH, NGOs

- Nutritional status and consumption pattern
- Morbidity and mortality
- Household food availability

Some agencies, like USAID/FEWS, DG8 of EC, SCF-UK, are producing useful information in the countries. Their contribution is commendable, but it would be preferable for such agencies to strengthen national capacities, or at least make it a joint venture, rather than duplicating and undermining national efforts.

Information outputs and dissemination

Eritrea, Ethiopia and Sudan have regular EW publications that include ten-day meteorological bulletins produced by their Meteorological Departments, a monthly and quarterly bulletin covering a wide range of issues, special bulletins for

the cropping seasons for close follow-up of crop performance and pests, and other ad hoc reports such as food supply situation. The NEWU in Uganda produces ten-day meteorological information through the meteorological department and a quarterly bulletin on other issues. There is no NEWU in Somalia, but wide range of information is generated and disseminated by FAO, WFP and other NGOs. Nothing regular is produced from Kenya and Djibouti. The problem in Djibouti is lack of financial and technical resources. The situation in Kenya is different. Kenya is probably the richest country in the IGAD sub-region and has better technical capacity than other countries. Much data is collected regularly by the Central Bureau of Statistics (CBS) and the MoA, but too little of this data is analyzed and disseminated regularly. This results from weak institutional linkages, lack of coordination, and an overcentralised system. Data/information generated anywhere in the country goes to the office of the president and not to the designated NEWU in the MoA.

Shortcomings and constraints of the NEWS

- The NEWUs in all countries are understaffed and lack technically qualified professionals.
- They are heavily dependent on external financial assistance, and hence systems and processes initiated are often confronted with the problem of sustainability.
- Communication within national boundaries and between the countries and the sub-region (IGAD) is too weak to allow timely flow of information.
- Information reaches decision makers late and often is not examined seriously unless there is crisis.
- The EWSs in all countries are highly centralized (Ethiopia is showing some improvement) and are geared to serve the government and donors, which make them more of relief than a preparedness tool.
- The validity of the information produced from the NEWUs is often questioned. Donors do not seem to be comfortable with this, and they prefer to countercheck this information before they commit themselves to any aid assistance (The yearly FAO and WFP crop assessment missions are examples of this). This has often led to delayed response, causing unnecessary suffering.

INTERVENTIONS TO LESSEN THE EFFECTS OF DROUGHT

Sub-regional initiatives in support of drought mitigation

Since its establishment in 1986, IGAD has taken several initiatives relevant to drought mitigation in the sub-region. IGAD five-year development program.



The three focus areas of IGAD are food security and environment, infrastructure development and conflict resolution. IGAD has identified 17 priority projects in its five-year regional development plan which have direct relevance for drought mitigation.

Development of the REWS and the sub-regional disaster preparedness strategy.

The development of the REWS and the support given to the NEWS, as explained in previous sections, is an important step for drought preparedness strategy.

IGAD has been working on the formulation of a disaster/drought preparedness strategy for the sub-region. In 1994, a meeting of high-level decision makers was convened in Addis Ababa to discuss the measures that need to be taken to mitigate the effects of disaster in general and drought in particular in the sub-region and to recommend modalities for the formulation of a sub-regional disaster preparedness strategy.

On the basis of the recommendations made, IGAD embarked on the formulation of the strategy, with financial and technical support from UNSO and FAO. With inputs from national resource persons and international and national consultants, country and sub-regional disaster management profiles were finalized and sub-regional strategy draft documents were prepared in 1997. As a component of the strategy, the Food Aid Code of Conduct (FACC) was also drafted with the assistance of USAID and FAO. In January 1998, a regional workshop was held in Addis Ababa to discuss and amend the drafts for finalizing the sub-regional strategy.

Formulation of the CCD Sub-regional Action Programme (SRAP)

Environment, decertification and drought are inseparable, and the synergism between decertification and drought is evident. The latter is explicit in both the IGAD charter and the CCD. Cognizant of this fact, IGAD has been active in all regional and international environmental issue forums. It has actively participated in and contributed to the Earth Summit of Rio in 1992. After the Summit, IGAD was designated to be the lead organization to coordinate the implementation of the convention in the IGAD sub-region. Since then, some concrete actions have been taken by the IGAD Secretariat.

The CCD was approved by all the MS in 1994, and by the

end of 1997, each country had ratified the convention. In 1995, a high-level policy makers' meeting was convened in Khartoum that gave the IGAD Secretariat the mandate to formulate the SRAP in conformity with the convention. This was followed by a meeting with all stakeholders in Asmara, Eritrea, in 1995 to review the proposed framework for the elaboration of the SRAP.

In 1997, another meeting to set up a multi-disciplinary scientific and technical committee was convened in Nairobi with assistance from UNSO. The meeting set priority areas and activities for the SRAP. In another meeting held at the same time, a report by an ad-hoc group on institutional arrangements existing in the MS for the implementation of the SRAP was reviewed. The forum also discussed mechanisms for resource mobilization for the implementation of the SRAP.

In December 1997, a workshop was held in Kampala to brief sub-regional and other specialized institutions on the CCD and the SRAP and to solicit their cooperation in the implementation of the SRAP.

Currently, all countries are in the process of formulating National Action Programmes. Most of them seem to favour incorporating the concerns of CCD-NAP into the National Environmental Action Plan (NEAP), for which most have already done a lot of work. Djibouti, Eritrea, Ethiopia, Kenya are already working along this line.

The planning process and the implementation of the SRAP stress the participatory approach, involving all stakeholders, particularly the community, at the grassroots level. This approach is considered to be one of the key conditions for drought preparedness, response and mitigation. Therefore, the efforts being made to implement the CCD-SRAP in the sub-region are expected to greatly contribute to drought mitigation in the long term.

Desert Margins Initiative (DMI)

IGAD has also been actively participating in discussions on the Desert Margins Initiative, which is complimentary to the CCD.

Drought mitigation interventions at the national and sub-national level by governments and NGOs.

Short-term interventions

Food-for-work programs have been useful in helping vulnerable population groups acquire some of their immediate

food needs, and, in turn, their participation in activities such as soil and water conservation, afforestation, water supply contribute to the overall development endeavor.

Credit facilities have been introduced in some countries, mostly by NGOs for farm and implements and petty trading to help poor people generate and diversify their income. This kind of initiative was found to be very useful and helpful in the drought-prone areas in Ethiopia (REST/EU, 1997). But, due to limited resources, the scale of the credit is too small, compared to the needs.

The provision of seed and other farm implements for replanting crops damaged by short drought spells has been another useful intervention by governments and NGOs. Similarly, restocking of livestock projects has been introduced in the pastoral areas (Kenya, Sudan).

The establishment of food reserves in and around drought-prone localities was an important measure in some countries. They helped minimize local food shortages and stabilize food markets (Eritrea, Ethiopia, Sudan).

Long-term interventions

Long-term interventions are geared toward attacking the root causes of drought vulnerability. Thus, there are no long-term drought interventions per se, but rather development plans and programs. The activities are focused mostly on water supply development, soil and water conservation, environmental protection and rehabilitation, afforestation, infrastructure development. The emphasis, however, varies between countries. For example, in Djibouti and Somalia, water supply development is the main focus because in most parts of these mostly arid countries it is the basis for all other development activities (livestock development, irrigation, afforestation, environmental rehabilitation). Within a given country, the focus differs as well. While in the highland areas environmental protection and rehabilitation is the main focus, in the lowland areas, water supply is the main thrust. Countries therefore have many interventions funded through government budgets, bilateral aid, and NGOs. It is not easy to give details of all interventions. But it is important to note that what is being done is not enough, especially in the area of water supply and rangelands development.

From the reviews of NGO projects (Sudan, Eritrea, Djibouti), it was evident that there have been problems of sustainability, maintenance and continuity. The maintenance of water supply systems is a very serious problem elsewhere.

This is partly due to a failure to involve communities. In some areas, communities were given the mandate for the water supply management and maintenance and given some basic skill training and equipments. In general, more should be done in water supply development, starting from identifying and adopting appropriate technology for water supply management and maintenance, especially in the ASALS, where water is the foundation of survival.

Contribution of NGOs to drought mitigation

The number of NGOs operating in the sub-region is very large. Although their contribution to relief programs has been commendable, their efforts in drought mitigation have been rather inadequate. Their programs have in most cases been relief-oriented, small-scale, fragmented, and of short duration; they have also been duplicative and uncoordinated. This was partly due to the failure of governments to have the necessary policies, guidelines, plans and programs to use the NGOs effectively. Other reasons are NGO internal policies and lack of understanding of the relationship between relief and development. This situation is now changing. The relief-to-development continuum is taking momentum. Both governments and NGOs have realized the need to move to long-term development programs that attack the root causes of drought vulnerability. But, even with this realization unless countries develop clear policies and plans for drought preparedness and mitigation, nothing substantial will be achieved.

A review of the current government and NGO relationships and coordination reveals that, as expected, there are variations in the countries. NGO programs do not seem to be coordinated in Djibouti, Kenya and Uganda. In order to streamline the role of NGOs in development, Eritrea and Ethiopia have come out with clear policies and guidelines. Eritrea has issued a decree that NGOs can only implement sectoral plans and programs. They will not be allowed, as before, to develop and implement their own plans and programs. Ethiopia, one of the NGO harbors since the droughts and famines of 1973 and 1984 has finally developed mechanisms for legal registration, coordination, and participation of NGOs in the country. This is in conformity with the NPDPPP. In order to properly streamline and consolidate good partnerships in development, a workshop was held in Addis Ababa in February 1998 to discuss and formulate the "NGO Code of Conduct" for Ethiopia.

Community contribution in drought mitigation

The success of all interventions depends on the involvement

of the people. Where people have been given the chance to be part of the development endeavor, they have accomplished a great deal. In Sudan, for example, a community forestry project in seven states in the east and central part of the country has been rated as one of the most successful and exemplary community projects in the developing countries. Not only has it shown what people can do if given the chance, but it has also demonstrated how much people can change the environment. The summer program mobilizes people, including about 40,000 students, annually to work on environmental rehabilitation program in Eritrea. It has shown a remarkable effect in only three years. The soil and water conservation activities being undertaken by the communities in the northern part of Ethiopia have become a Center of attraction for development agencies the world over. Although the production is still low, crop production has doubled and some bushes have made a come back after decades of neglect. These and other experiences demonstrate that the key to our success in combatting drought and decertification lies in the hands of the people.

POST-DROUGHT ASSESSMENT

Post-drought assessment could be a useful instrument to improve drought preparedness strategy, but such exercises do not appear to be a common practice. This is typical of crisis management. There is no systematic documentation on drought impacts in the countries. It was not possible to get quantitative information on the social and economic impacts associated with drought events, the amount of funds used, or the approaches employed for response. This is especially the case with the recent episodes. The figures obtained in most cases were either conflicting or exaggerated, because they were not derived from post-drought assessment but from estimations for relief assistance. This is one of the crucial areas for operational research in methodology development.

CONSTRAINTS TO ACHIEVE HIGHER LEVELS OF DROUGHT PREPAREDNESS

As indicated earlier, there has been improvement in drought response over the years, but the desired level of preparedness has not been attained. There are many reasons for this, ranging from lack of awareness to absence of policies and concrete plans. The constraints to achieving effective drought preparedness are similar in all the countries of the sub-region, but may differ in their ranking. They include:

- Lack of clear policies, legislation and coordination mechanisms for drought management;
- Conceptual problems and lack of experience in shifting from crisis management to preparedness and mitigation;

- Lack of decentralized functional management systems;
- Inadequate community involvement and awareness;
- Shortage and mismanagement of resources: financial, material, manpower;
- Weak infrastructure, particularly community systems;
- Weak sub-national level capacity in every country, especially in the ASALS;
- Institutional split between relief and development, which hampers the linkages between relief, rehabilitation and mitigation;
- Inefficient EWS.

LINKS BETWEEN SUB-REGIONAL, NATIONAL AND SUB-NATIONAL LEVEL MECHANISMS

Sub-regional links

IGAD has established links with other sub-regional organizations in the continent dealing with drought issues like SADC, CILSS. There has been an exchange of visits between IGAD experts and SADC, and also an exchange of EW methodologies between the two REWU in Djibouti and Harare. Similarly, IGAD has made use of the experience of CILSS to formulate the FACC for the IGAD sub-region. DLCO-EA is an ally in the control of desert locust and other pests, which are other forms of disasters causing food shortages and contributing to decertification and drought in the sub-region. It has also good links with the regional offices of UNO, UNEP, the Remote Sensing Center and the Drought Monitoring Centre, all in Nairobi.

Sub-regional and national links

There are direct links between the IGAD and institutions in the MS involved directly or indirectly with drought preparedness and mitigation. The links are established in various ways. Direct communication, through exchange of publications, training programs, workshops, annual review meetings, formation of special working groups of experts from the MS, and the technical assistance provided by regional experts. The annual meeting of the heads of the NEWU and Meteorological Services and the annual joint meeting of Meteorological Departments of MS/IGAD/WMO could be cited as examples. Such forums have been very useful for exchange of experiences and exposure to new methodologies and technologies, thus upgrading the knowledge and skills of professionals working in national institutions.

National and sub-national links

The linkages between national and sub-national levels is very vital factor for effective drought preparedness strategy.

Unfortunately, this linkage is generally weak in practice and aggravated by the lack of decentralization. Efforts made to develop sub-national capacity by the national level in most countries is very negligible with the exception of Ethiopia which in the last two years has attempted to do something following the declaration of the NPDPP.

THE ROLE OF INTERNATIONAL, MULTILATERAL AND BILATERAL ORGANIZATIONS IN DPM IN THE SUB—REGION

UN Agencies

Among the UN organizations, UNDP/UNSO, FAO, UNICEF, WFP, UNHCR, and UNEP are currently playing a significant role directly or indirectly in drought preparedness, responses and mitigation in the sub-region.

WFP, UNHCR and UNICEF are principally involved in relief operations and partially involved in assisting rehabilitation programs through food-for-work programs.

UNDP/UNSO's contribution to drought preparedness and mitigation is both direct and indirect. It is providing assistance for the development of national disaster/drought preparedness strategies. It has provided substantial support to the development of the Ethiopian NPDPP and has allocated funds for similar exercise in Eritrea and Uganda. But these programs have not yet materialized. UNDP's Disaster Management Training Programs have been greatly appreciated by MS. Moreover, its indirect support of drought mitigation comes from its support to the overall development programs in the MS.

FAO has directly and indirectly contributed and continues its support to drought preparedness and mitigation in the sub-region. It executed the REWS project in IGAD from 1990 to 1995 and continues to support the market information component and the Eritrean EWS. Furthermore, it has provided financial and technical support to IGAD for the formulation of regional disaster preparedness strategy and the FACC.

UNDP/UNSO is an important partner on CCD and drought preparedness and mitigation in the IGAD sub-region. It has supported IGAD in the preparation of national and sub-regional disaster/drought management profiles. Its support for the formulation of the SRAP and associated activities has been useful.

UNEP has committed itself to contributing to the implemen-

tation of the CCD until the end of 1999, and some of the activities planned are relevant to drought mitigation. It has also provided support to country programs on environmental issues (Kenya, Sudan).

Multilateral and bilateral agencies

USAID, EU, the Italian Cooperation, GTZ, SIDA-Sweden, CIDA-Canada, Netherlands, the World Bank are among the major partners providing assistance to the sub-regional organization and directly to the MS for drought mitigation-related interventions. For example, USAID and Italy are assisting IGAD in developing the RIIS, and IGAD capacity building is being assisted by GTZ, USAID, Canada. The agencies are also providing support to MS directly (e.g., the lion's share of the water supply development programs in Djibouti are financed by the DG8 of EC, GTZ and UNICEF). Ethiopia is getting some support from USAID, UNDP and SIDA-Sweden for the implementation of the NPDPP at sub-national level. EU, UNDP, FAO, Italy, UNICEF and NGOs have been implementing many projects with high relevance for drought mitigation in Somalia (Farah, 1995).

Major sub-regional activities in support of drought issues

Major partners

IGA capacity building
USAID, GTZ, Canada

Regional EW and Market Information
Italy, FAO

Regional Integrated Information System
USAID, Italy

Regional Remote sensing Application
EU

Regional Disaster Strategy Formulation
UNDP/UNSO, FAO

CCD-SRAP Formulation and Implementation
UNDP/UNSO, UNEP

Relief, Rehabilitation, Reintegration
WFP, UNICEF, UNDP

Formulation of the Food Aide Code (FACC)
USAID, FAO



Agency Coordination

At the sub-regional level there is good coordination, as witnessed during the revitalization of IGAD and the forum that was created by "Friends of IGAD". But, at country level, there are still weaknesses in the intra- and inter-agency coordination. Similarly, the coordination between government and other agencies is not satisfactory in many countries. Coordination should be improved for concerted action to combat the effects of drought through genuine partnership of stakeholder.

MAJOR CONCLUSIONS

1. Although drought is not completely understood, we do have enough knowledge to take mitigative actions.
2. Drought still continues to be a threat. But there is better awareness and preparedness so that its social impact is less severe than it was a decade ago. However, there are still impediments to effective drought preparedness that should be addressed.
3. Drought management has not been proactive; it is still under crisis management. The experience of countries with drought preparedness is limited, but awareness has improved.
4. The lack of explicit policy and planning process on drought preparedness appears to be the major constraint in developing effective strategy.
5. Post-drought assessment and systematic documentation of drought events and impacts is lacking everywhere, and no methodology exists to facilitate these processes.
6. Although most governments of the sub-region have policies on decentralization, in practice they do not exist, with the exception of Ethiopia and to some extent Uganda. The linkages between the national and sub-national levels are weak. This has affected the capacity building of the sub-national levels in drought management.
7. The inputs from NGOs have not been effectively used for drought mitigation, and the involvement of the private sector in drought preparedness and response has not been addressed. The responsibility of drought preparedness and mitigation is still handled almost wholly by government institutions with meagre resources.
8. The EWS in the sub-region is generally weak and has not been given due attention by governments and donors. Thus, the information produced is not "timely" and not of high quality. The meteorological component is somewhat better.
9. Many actions that contribute directly and indirectly to drought preparedness, response and mitigation have been implemented by governments and NGOs.

However, they were not integrated into the overall development plan and programs. Therefore, although they have contributed something, the interventions have not been visible and/or sustainable in most cases.

10. It is a paradox that although 80% of the sub-region is arid and semi-arid very prone to drought, programs that address the special problems of the ASALS have not been addressed (water supply, rangelands management, drought-tolerant tree and crop species). Some research has been done on drought-tolerant species in some countries (Ethiopia, Kenya, Sudan), but have not been applied regionally.

RECOMMENDATIONS

Many recommendations could be given, but only the major ones are listed here.

1. Where policies and drought preparedness exist, contingency planning crisis management will persist. Thus, there is a need to assist countries formulate drought policies and plans. The initiative taken by UNDP in some countries is commendable, but requires close follow-up. The experience of Ethiopia is worth sharing with other countries.
2. Strengthen the sub-national level capacity and empower communities in the drought-prone areas in drought preparedness and response, built on the long-term coping strategies they have developed.
3. Drought preparedness and response involves more coordination than control. Therefore, the centralized powers must be shared with the lower units where the problem prevails.
4. Governments should make best use of NGO inputs to improve the effectiveness of drought preparedness, response and mitigation and also solicit the involvement of the private sector in some aspects of the strategy. (e.g., food reserve and distribution, information system). Research is needed to identify the role the private sector can play in drought preparedness and response.
5. The development of cross-border programs to combat drought and decertification is vital. IGAD could form a standing technical committee for drought issues, made up of experts from the MS with the responsibility of monitoring drought events and impacts, evaluating actions taken and resources and mechanisms used, and recommending improvements for future interventions.
6. The need to strengthen and support the EWS should not be ignored, because drought preparedness without effective EWS will not be possible.
7. Special attention is required to address the problems of

the ASALs, especially in water supply development and the promotion of drought-tolerant tree and crop species. There is a need for an interlocutor between research, extension, and the community.

8. The solution may not be easy, but land use planning is crucial if the long-term drought problem is to be minimized.
9. It is necessary to undertake a vulnerability assessment as the first step in drought preparedness. Some countries (Eritrea, Ethiopia, Sudan, Kenya), with assistance from bilateral agencies and NGOs, are already doing something and need to be assisted. The experience from these countries could then be used for other countries and the sub-regional organization.
10. Improved impact techniques, especially in the agriculture sector, need to be developed.

RESEARCH NEEDS

Coping strategies:

- Their implication for the drought preparedness planning process.
- Operational research on methodology development for post-drought assessment and documentation.
- The role the private sector could play in drought preparedness and response.

INTRODUCTION

Widespread and severe drought conditions have plagued the countries of Sub-Saharan Africa on numerous occasions during the 1990s. These droughts have resulted in serious economic, environmental, and social impacts. These impacts have been described in detail in previous chapters. In response to these drought events, governments and donors have directed considerable attention to alleviating some of the hardships associated with these extended drought conditions. Many countries in the region have attempted to build institutional capacity, not only to more efficiently respond to severe drought, but also to put into place various types of mitigation and preparedness programs. Even with all of these efforts, drought preparedness remains in the very early stages of development for most of these countries. In many cases some of the ingredients of a drought preparedness plan are in place or are a part of the vision of the future. What is often lacking is a process for achieving the goal of drought preparedness and the resources, both financial and human, to develop the plan.

In 1991, a 10-step planning process for states in the United States was published as a methodology for plan development (Wilhite, 1991). This process was intended to be generic so that it could be adapted to the needs of any level of government in any drought-prone region. This process has been used by states, tribal governments, water utilities, foreign governments, and others to guide them through the drought planning process. This original planning process, while recognizing the need for developing mitigation tools to reduce the impacts of drought, did not place as much attention on mitigation as is now warranted, given the growing emphasis on risk management in addressing the impacts associated with natural hazards. When first published, this planning process focused more attention on improving governmental response to drought emergencies through the development of greater institutional capacity directed at creating an appropriate organizational structure, improving monitoring capability, defining a more explicit decision making authority for implementing response measures, and improving information flow and coordination between and within levels of government.

The 10-step planning process was presented and used as a basis for discussions on drought planning at a series of regional drought training seminars on drought management organized by the International Drought Information Centre,

University of Nebraska. These seminars were held in eastern and southern Africa, Asia, and Latin America from 1989 to 1993, with sponsorship from the U.N. Environment Program, World Meteorological Organization, and the U.S. National Oceanic and Atmospheric Administration. One of the challenges presented to participants of these training seminars was to modify the 10-step planning process to best fit the needs of participating countries. Following this series of workshops, this planning process was revised and published by the U.N. Environment Program, *Preparing for Drought: A Guidebook for Developing Countries* (Wilhite, 1992). Wilhite updated this planning process 1996.

As vulnerability to drought has increased globally, greater attention has been directed at reducing risks associated with its occurrence through the introduction of planning to improve operational capabilities (i.e., climate and water supply monitoring, institutional capacity) and mitigation measures that are aimed at reducing drought impacts. This change in emphasis is long overdue. For example, losses associated with natural hazards in the United States averaged more than \$54 billion per year between 1992 and 1996 (Carolwicz, 1996) and the Federal Emergency Management Agency (FEMA, 1995) estimates annual losses because of drought in the United States at between \$6-8 billion per year. Mitigating the effects of drought requires the use of all components of the cycle of disaster management, discussed in Chapter 1, rather than only the crisis management portion of this cycle. Because of past emphasis on crisis management, society has generally moved from one disaster to another with little, if any, reduction in risk.

The purpose of this chapter is to describe the 10-step drought planning methodology for Sub-Saharan African countries. The goal of the 10-step planning process is to derive a plan that is dynamic, reflecting changing government policies, technologies, natural resources management practices, and so forth. The goal is not to produce a static document or plan. To reiterate, the 10-step planning process is intended to identify the issues that should be addressed in plan development, with appropriate modifications to each setting.

PLANNING FOR DROUGHT: THE PROCESS

Drought is a natural hazard that differs from other hazards in that it has a slow onset, evolves over months or even years, affects a large spatial region, and causes little structural dam-

age. Its onset and end are difficult to determine, as is its severity. The impacts of drought span economic, environmental, and social sectors. However, like other hazards, drought's impacts can be reduced through mitigation and preparedness. Because droughts are a normal part of climate for virtually all regions, it is important to develop plans to deal with these extended periods of water shortage in a timely, systematic manner as they evolve. This planning needs to occur at all levels of government and be integrated.

This planning process has gone through further modifications in recent years as a result of lessons learned from recent drought planning workshops in the United States, Mexico, and Brazil. These workshops were conducted by the National Drought Mitigation Centre (NDMC), and have relied on the 10-step process as an organizational tool to facilitate the development of drought plans where mitigation and risk/vulnerability assessment were key components of the discussion.

In brief, Steps 1-4 of the planning process focus on making sure the right people are brought together, have a clear understanding of the process and what the drought plan must accomplish, and are supplied with adequate data to make fair and equitable decisions when formulating and writing the actual drought plan. Step 5 describes the process of establishing committees and writing the drought plan. Steps 6 and 7 detail the need for ongoing research and coordination between scientists and policy makers. Steps 8 and 9 stress the importance of promoting and testing the plan before drought occurs and developing appropriate educational programs to build public awareness. Finally, Step 10 emphasizes revising the plan to keep it current and making an evaluation of the plan's effectiveness in the post-drought period.

10 Steps for Drought Planning

- 1– Appoint a drought task force
- 2– State the purpose and objectives of the drought plan
- 3– Seek stakeholder participation and resolve conflict
- 4– Inventory natural, biological, and human resources and identify sectors, regions, and populations most at risk
- 5– Prepare/Write the drought plan
- 6– Identify research needs and fill institutional gaps
- 7– Integrate science and policy
- 8– Publicize the drought plan, build public awareness
- 9– Develop education programs
- 10– Evaluate and revise drought plan

Step 1: Appoint a Drought Task Force

The drought planning process is initiated through the appointment of a drought task force. The task force has two purposes. First, the task force will supervise and coordinate development of the plan. Second, after the plan is developed and during times of drought when the plan is activated, the task force will coordinate actions, implement mitigation and response programs, and make policy recommendations to the appropriate person or elected official and legislative body.

The task force should reflect the multi disciplinary nature of drought and its impacts, including representatives of state or provincial government, districts, villages, and national government. It is also imperative that experts from universities be included where appropriate. A representative from the President or Prime Minister's office should be a member of the task force. Environmental and public interest groups can be included on the task force or can serve on an advisory council (see Step 3), as appropriate. The actual makeup of this task force would be highly variable between countries, reflecting the variety of economic sectors and population groups affected and the existing political infrastructure.

Depending on the nature of recent experiences with drought, the task force may find itself in the public spotlight from the outset, or it may work in relative obscurity. No matter what the initial level of public attention is, the task force needs to incorporate people who know how to conduct effective two-way communication with the public. The task force should include a public information official who is familiar with local media's needs and preferences, and a public participation practitioner who can help establish a process that includes and accommodates both well-funded and disadvantaged stakeholder or interest groups.

Step 2: State the Purpose and Objectives of the Drought Plan

As its first official action, the drought task force should state the general purpose for the drought plan. Members of the task force should consider many questions as they define the purpose of the plan, such as the:

- purpose and role of government in drought mitigation and response efforts;
- scope of the plan;
- most drought-prone areas;
- most vulnerable economic and social sectors;
- role of the plan in resolving conflict between water users and other vulnerable population groups during periods of shortage;

- current trends (e.g., land and water use, population growth) that may increase/decrease vulnerability and conflicts in the future;
- resources (human and economic) that the government is willing to commit to the planning process;
- legal and social implications of the plan; and
- principal environmental concerns caused by drought.

A generic statement of purpose for a plan is to provide government with an effective and systematic means of assessing drought conditions, developing mitigation actions and programs to reduce risk in advance of drought, and developing response options that minimize economic stress, environmental losses, and social hardships during drought.

The task force should then identify the specific objectives of the plan. Drought plan objectives will, of course, vary between countries and should reflect unique physical, environmental, socioeconomic, and political characteristics. Objectives that government should consider include the following:

- Collect, analyze and disseminate drought-related information in a timely and systematic manner.
- Establish criteria for declaring drought and triggering various mitigation and response activities.
- Provide an organizational structure that assures information flow between and within levels of government, as well as with non-governmental organizations, and that defines the duties and responsibilities of all agencies with respect to drought.
- Maintain a current inventory of drought assistance programs used in assessing and responding to drought emergencies, and provide a set of appropriate action recommendations.
- Identify drought-prone areas and vulnerable sectors, population groups, and environments.
- Identify mitigation actions that can be taken to address vulnerabilities and reduce drought impacts.
- Provide a mechanism to ensure timely and accurate assessment of drought's impacts on agriculture, industry, municipalities, wildlife, health, and other areas, as well as specific population groups.
- Keep the public informed of current conditions and response actions by providing accurate, timely information to media in print and electronic form.
- Establish and pursue a strategy to remove obstacles to the equitable allocation of water during shortages and provide incentives to encourage water conservation.
- Establish a set of procedures to continually evaluate and exercise the plan and periodically revise the plan so it will stay responsive to the needs of the people and government ministries.

Step 3: Seek Stakeholder Participation and Resolve Conflict

Social, economic and environmental values often clash as competition for scarce water resources intensifies. Therefore, it is essential for task force members to identify all citizen groups that have a stake in drought planning (stakeholders) and their interests. These groups must be involved early and continuously in order for there to be fair representation and effective drought management and planning. Airing concerns early in the process gives participants a chance to develop understanding of one another's various viewpoints, and to generate collaborative solutions. Although the level of involvement of these groups will vary notably from country to country, the power of public interest groups in policy making is often considerable. In fact, these groups are likely to impede progress in the development of plans if they are not included in the process. The task force should also protect the interests of stakeholders who may lack the financial resources to serve as their own advocates. One way to facilitate public participation is to establish a citizen's advisory council as a permanent feature of the drought plan, helping the task force keep information flowing and resolve conflicts between stakeholders.

It may be worthwhile to consider establishing advisory councils at the local or district level. Local councils could be developed to bring neighbors together to discuss their water use issues and problems and seek collaborative solutions. A representative of local councils should be included on the drought task force.

Step 4: Inventory natural, biological, and human resources and identify sectors, regions, and populations most at risk

An inventory of natural, biological, and human resources, including the identification of constraints that may impede the planning process may need to be initiated by the task force. The amount and variety of information available will vary considerably between settings. It is important to determine the vulnerability of these resources to periods of water shortage that result from drought. Resources include, for example, physical and biological resources, infrastructure, and capital available to government. The most obvious natural resource of importance is water; where it is located, how accessible is it, of what quality is it? Biological resources refer to the quantity and quality of grasslands/rangelands, forests, wildlife, and so forth. Human resources include the labor needed to develop water resources, lay pipeline, haul water and livestock feed,

process citizen complaints, provide technical assistance, and direct citizens to available services. In addition, representatives of government determine what local, state/provincial, federal/national agencies or NGOs may need to be enlisted for action.

It is also imperative to identify constraints to the planning process and to the activation of the plan in response to a developing drought. These constraints may be financial or legal. The costs associated with the development of a plan must be weighed against the losses that will likely result if no plan is in place. The purpose of a drought plan is to reduce risk and, therefore, impacts. Legal constraints include user water rights, existing public trust laws, requirements for public water suppliers, and so forth.

In drought planning, making the transition from crisis to risk management is difficult because, historically, little has been done to understand and address the risks associated with drought. To solve this problem, areas of high risk should be identified, as should actions that can be taken before a drought occurs to reduce those risks. Risk is defined by both the exposure of a location to the drought hazard and the vulnerability of that location to periods of drought-induced water shortages (Blaikie et al., 1994). Drought is a natural event; it is important to define the exposure (i.e., frequency of drought of various intensities and durations) of various parts of the country to the drought hazard. Some areas are likely to be more at risk than others. Vulnerability, on the other hand, is defined by social factors such as land use patterns, government policies, social behaviour, water use, population, economic development, diversity of economic base, cultural composition, and so forth. The drought task force should address these issues early in the planning process so they can provide more direction to the committees and working groups that will be developed under Step 5 of the planning process.

Step 5: Preparation of Drought Plan

This step describes the process of establishing relevant committees to develop the components of the drought plan and to write the plan. The drought plan should have three primary components: monitoring, impact and vulnerability assessment, and mitigation and response. It is recommended that a committee be established to focus on the first two of these needs; the mitigation and response function can in most instances be carried out by the drought task force.

These committees will have their own tasks and goals, but well-

established communication and information flow between committees is still a necessity to ensure effective planning.

Monitoring committee

A reliable assessment of water availability and its outlook for the near- and long-term is valuable information in both dry and wet periods. During a drought, the value of this information increases. The monitoring committee should include representatives from agencies with responsibilities for monitoring climate and water supply. It is recommended that data and information on each of the applicable indicators (e.g., precipitation, temperature, evapotranspiration, long-range weather forecasts, soil moisture, streamflow, ground water, reservoir and lake levels, and snowpack) be considered in the committee's evaluation of the water situation and outlook for the country. The agencies responsible for collecting, analyzing, and disseminating data and information will vary according to each country's infrastructure. The monitoring committee should meet regularly, especially in advance of the peak demand season.

Following each meeting, reports should be prepared and disseminated to the drought task force, as well as to donors/NGOs and the media. The chairperson of the monitoring committee should be a permanent member of the drought task force. In many countries, this will be someone from the department of meteorological services. If conditions warrant, the task force would brief the Prime Minister or President about the contents of the report, including any recommendations for specific actions. It is essential for the public to receive a balanced interpretation of changing conditions. The monitoring committee should work closely with public information specialists to keep the public well-informed.

The monitoring committee has six primary objectives:

1. Adopt a workable definition of drought that could be used to phase in and phase out drought assistance programs initiated in response to drought. It may be necessary to adopt more than one definition of drought in identifying impacts in various economic, social, and environmental sectors. Several indices are available (Hayes, 1998), including the Standardized Precipitation Index (McKee et al., 1993; 1995) which is gaining widespread acceptance (Guttman, 1998; Hayes et al., 1998). The trend is for governments to rely on multiple climate/drought/water supply indices to trigger responses, which are calibrated to various intensities of drought.

No single index of drought is adequate to measure the complex interrelationships between the various components of the hydrological cycle and impacts.

It is helpful to establish a sequence of descriptive terms for water supply alert levels, such as "advisory," "alert," "emergency," and "rationing" (as opposed to more generic terms such as "phase 1" and "phase 2," or sensational terms such as "disaster"). These alert levels should be defined in discussions with both the Vulnerability and Impact Assessment Committee and the task force.

2. Establish drought management areas (i.e., subdivide the country into more conveniently sized districts by political boundaries, shared hydrological characteristics, climatological characteristics, or other means such as drought probability or risk). These subdivisions may be useful in drought management since they may allow drought stages and mitigation and response options to be regionalized.
3. Develop a drought monitoring system. Most African countries already have a data collection system in place for monitoring climate and water supplies and identifying potential shortfalls. Responsibility for collecting, analyzing, and disseminating the data is often divided between many various ministries. The monitoring committee's challenge is to coordinate and integrate the analysis so decision makers and the public receive early warning of emerging drought conditions. Drought early warning systems and other complementary systems to monitor food security/famine issues are in place. Resources to publish and distribute this information on a routine basis has been identified as a serious problem in some of the countries included in this report.
4. Inventory data quantity and quality from current observation networks. A variety of networks exist that monitor key elements of the hydrologic system. Meteorological data are important but represent only one part of a comprehensive monitoring system. Other physical indicators must be monitored to reflect impacts of drought on agriculture, households, industry, energy production, and other water users. Helpful technology includes soil moisture sensors, automated weather stations, and satellite data such as digital data obtained from the Advanced Very High Resolution Radiometer (AVHRR), transmitted from a National Oceanic and Atmospheric Administration satellite, is useful in detecting areas where moisture deficiencies are affecting vegetation growth.
5. Determine the data needs of primary users. Developing new systems for collecting and analyzing data works best when the people who will be using the data are consult-

ed early and often. Soliciting input on expected new products or obtaining feedback on existing products is critical to ensuring that products meet the needs of primary users and, therefore, will be used in decision making. Training on how to use or apply products in routine decision making is also essential.

6. Develop and/or modify current data and information delivery systems. People need to be warned of drought as soon as it is detected, but often are not. Information needs to reach people in time for them to use it in making decisions. In establishing information channels, the monitoring committee needs to consider when people need what kinds of information. These decision points can determine whether the information provided is used or ignored.

Vulnerability and Impact Assessment Committee

Drought impacts cut across many sectors and across normal divisions of responsibility for government ministries. These impacts have been classified by Wilhite (1992). As discussed in Step 4, impacts are the result of exposure to the drought hazard (i.e., probability of occurrence) and a combination of economic, environmental, and social factors. Therefore, in order to reduce vulnerability to drought, it is essential to identify relevant impacts and assess their underlying causes.

Information on drought's impacts and their causes is crucial for reducing risk before drought occurs and for appropriate response during drought. The membership of the Vulnerability and Impact Assessment Committee should represent economic sectors, social groups, and ecosystems most at risk from drought. The committee's chairperson should be a member of the drought task force.

The most effective approach to follow in determining the vulnerability to and impacts of drought is to create a series of working groups under the aegis of the Vulnerability and Impact Assessment committee. The responsibility of the committee and working groups is to assess sectors, population groups, and ecosystems most at risk and identify appropriate and reasonable mitigation measures to address these risks. Working groups would be composed of technical specialists representing each of the sectors, groups, or ecosystems at risk. The chair of each working group, as a member of the Vulnerability and Impact Assessment committee, would report directly to it. With this model, the responsibility of the committee is to direct the activities of each of the working groups

and make recommendations to the drought task force on mitigation actions. The number of working groups will vary considerably, reflecting important impact sectors.

A methodology for assessing and reducing the risks associated with drought has recently been completed as a result of collaboration between the NDMC and the Western Drought Coordination Council's (WDCC) Mitigation and Response Working Group (Knutson, et al., 1998) and is available on the WDCC's web site as a .pdf document at <http://enso.unl.edu/wdcc/products/risk.pdf>. The guide focuses on identifying and prioritizing drought impacts, determining their underlying causes, and choosing actions to address the underlying causes. This methodology can be employed by each of the working groups. This effort requires an interdisciplinary analysis of impacts and management options and is divided into six tasks:

1. Assemble the team. Each working group should represent stakeholders, government planners, and others with a working knowledge of drought's effects on primary sectors, regions, and people.
2. What are the effects of drought? Identify how drought has affected the region or enterprise for which you are planning. Consult climatological records to determine the "drought of record," the worst in recorded history, and project what would happen if a similar drought occurred this year or in the near future, considering changes in land use, population growth, and development that have taken place since that drought.
3. Ranking of impacts. Determine which of drought's effects are most urgently in need of attention. Various considerations in prioritizing these effects include cost, areal extent, trends over time, public opinion, social equity, and the ability of the affected area to recover.
4. Identify underlying causes. Determine those factors that are causing the highest levels of vulnerability for various sectors, regions, and populations. For example, an unreliable source of water for municipalities in a particular region may explain the impacts that have resulted from recent droughts in that area. To reduce the potential for drought impacts in the future, it is necessary to understand the underlying environmental, economic, and social causes of these impacts. To do this, drought impacts must be identified and the reason for their occurrence determined.
5. Identify ways to reduce risk. Ideally, identify actions that can be taken before drought that will eliminate or reduce vulnerability to drought. In the example above, taking steps to identify new or alternative sources of water could

increase resiliency to subsequent episodes of drought.

6. Write the "to do" list. Choose which actions are likely to be the most feasible, cost-effective, and socially equitable. Implement steps to address these actions through existing government programs or the legislative process.

The choice of specific actions to deal with the underlying causes of the drought impacts will depend on the economic resources available and related social values. Typical concerns are associated with cost and technical feasibility, effectiveness, equity, and cultural perspectives. This process has the potential to lead to the identification of effective and appropriate drought risk reduction activities that will reduce long term drought impacts rather than ad hoc responses or untested mitigation actions that may not effectively reduce the impact of future droughts.

Mitigation and response committee

Mitigation and response actions could be under the responsibility of the drought task force or could be assigned to a separate committee. It is recommended that the task force, working in cooperation with the Monitoring and Vulnerability and Impact Assessment committees, should have the knowledge and experience to understand drought mitigation techniques, risk analysis (economic, environmental, and social aspects), and drought-related decision-making processes at all levels of government. The task force, as originally defined, is composed of senior policy makers from various ministries and representatives from NGOs. Therefore, they are in an excellent position to recommend and/or implement mitigation actions, request assistance through various programs, or make policy recommendations to the legislative body or the Prime Minister/President.

Mitigation and response actions must be determined for each of the principal impact sectors identified by the Vulnerability and Impact Assessment committee. Wilhite (1992; 1997) recently completed an assessment of drought mitigation technologies implemented by states in the United States in response to drought conditions during the late 1980s and early 1990s. However, the transferability of these technologies to specific situations in other locations needs to be evaluated. These drought mitigation technologies are available on the NDMC's web site (<http://enso.unl.edu/ndmc/mitigate/policy/tools.htm>).

Additionally, the committee/task force should inventory all forms of assistance available from government and other sources during severe drought. The committee/task force

should also evaluate these programs for their ability to address short-term emergency situations and long-term mitigation programs to reduce risk to drought. Assistance should be defined in a very broad way to include all forms of technical and relief programs available.

Writing the Plan

With input from each of the committees and working groups, the drought task force, with the assistance of professional writing specialists, will undertake the assignment of drafting the drought plan. After several iterations, it is recommended that public meetings or hearings be held at several locations to explain the purpose, scope, and operational characteristics of the plan. Discussion must also be presented on the specific mitigation actions and response measures recommended in the plan. The public information specialist on the drought task force can facilitate planning for the hearings and also prepare news stories announcing the meetings and providing an overview of the plan.

As mentioned previously, the plan should not be considered a static document. The plan is dynamic and a copy of the plan should be available through the drought task force web site.

Step 6: Identify Research Needs and Fill Institutional Gaps

As research needs and gaps in institutional responsibility become apparent during drought planning, the drought task force should compile a list of those deficiencies and make recommendations on how to remedy them to the appropriate ministry. Step 6 should be carried out concurrently with Steps 4 and 5. For example, the monitoring committee may recommend establishing or enhancing an existing ground water monitoring program. Another recommendation may be to initiate research on the development of a climate or water supply index to help monitor water supplies and trigger specific actions by government.

Step 7: Integrate Science and Policy

An essential aspect of the planning process is integrating the science and policy of drought management. The policy maker's understanding of the scientific issues and technical constraints involved in addressing problems associated with drought is often negligible. Likewise, scientists generally have a poor understanding of existing policy constraints for responding to the impacts of drought. Communication and understanding between the science and policy communities is poorly developed and must be enhanced if the planning process is to be successful.

Good communication is required between the two groups in order to distinguish what is feasible from what is desirable for a broad range of science and policy issues. Integration of science and policy during the planning process will also be useful in setting research priorities and synthesizing current understanding. The drought task force should consider various alternatives to bring these groups together and maintain a strong working relationship.

Step 8: Publicize the Drought Plan, Build Public Awareness

If there has been good communication with the public throughout the process of establishing a drought plan, there may already be better than normal awareness of drought and drought planning by the time the plan is actually written. Themes to emphasize in writing news stories during and after the drought planning process could include:

How the drought plan is expected to relieve impacts of drought. Stories can focus on the human dimensions of drought, such as how it affects households; on its environmental consequences, such as reduced wildlife habitat; and on its economic effects, such as the costs to a particular industry or to the country's overall economy.

What changes people might be asked to make in response to different degrees of drought, such as restricted use of water for non-essential uses, or not irrigating certain crops at certain times.

In subsequent years, it may be useful to do "drought plan refresher" news releases at the beginning of the most drought-sensitive season, letting people know whether there is pressure on water supplies or reasons to believe that there will be shortfalls later in the season, and reminding them of the plan's existence, history, and any associated success stories. It may be useful to refresh people's memories ahead of time on circumstances that would lead to water use restrictions.

During drought, the task force should work with public information professionals to keep the public well informed of the current status of water supplies, whether conditions are approaching "trigger points" that will lead to requests for voluntary use restrictions, and how victims of drought can access assistance and what types of assistance are available.

Step 9: Teach People About Drought

A broad-based education program to raise awareness of short- and long-term water supply issues will help ensure that

people know how to respond to drought when it occurs and that drought planning does not lose ground during non-drought years. It would be useful to tailor information to the needs of school-age children, small business, industry, homeowners, utilities, and other groups. The task force or a participating agency should consider developing presentations and educational materials for events such as a water awareness week, community observations of Earth Day, relevant trade shows, specialized workshops, and other gatherings that focus on natural resource stewardship or management.

Step 10: Continue to Evaluate Drought Risk and the Drought Plan

The final step in the planning process is to create a detailed set of procedures to ensure adequate plan evaluation. Periodic testing, evaluation and updating of the drought plan is essential to keep the plan responsive to national needs. To maximize the effectiveness of the system, two modes of evaluation must be in place:

Ongoing evaluation

An ongoing or operational evaluation keeps track of how societal changes such as new technology, new research, new laws, population shifts, and changes in political leadership may affect drought risk and the operational aspects of the drought plan. Drought risk may be evaluated quite frequently while the overall drought plan may be evaluated less often. An evaluation under simulated drought conditions (i.e., drought exercise) is recommended before the drought plan is implemented and periodically as needed.

Post-drought evaluation

A post-drought evaluation or audit documents and analyzes the assessment and response actions of government, non-governmental organizations, and others, and implements recommendations for improving the system. Without post-drought evaluations, it is difficult to learn from past successes and mistakes, as institutional memory fades.

Post-drought evaluation should include an analysis of the climatic and environmental aspects of the drought; its economic and social consequences; and the extent to which pre-drought planning was useful in mitigating impacts, in facilitating relief or assistance to stricken areas, and in post-recovery. Attention must also be directed to situations in which drought-coping mechanisms worked and where societies exhibited resilience; evaluations should not focus only on those situations in which coping mechanisms failed. Evaluations of previous responses to severe drought are also a good planning aid.

To ensure an unbiased appraisal, governments may wish to place the responsibility for evaluating drought and societal response to it in the hands of nongovernmental organizations such as universities and/or specialized research institutes.

SUMMARY AND CONCLUSION

Previous responses to drought in Africa and most other countries of the world have been, for the most part, reactive (i.e., crisis management). This approach has been demonstrated to be ineffective, poorly coordinated, and untimely in all political and geographical settings; more importantly, it has done little to reduce the risks associated with drought. In fact, the economic, social, and environmental impacts of drought have increased significantly in recent decades. A similar trend exists for all natural hazards.

This chapter presented a 10-step planning process that was developed about ten years ago in the United States in the development of a comprehensive drought plan. Since it was originally published, this process has been used at all levels of government in the United States and in many countries to

guide the development of a drought plan. The goal of this planning process is to derive a plan that is dynamic and incorporates greater emphasis on risk management and the adoption of appropriate mitigation actions. This approach is developed around the three primary components of a drought plan: monitoring and early warning; vulnerability and impact assessment; and mitigation and response. The 10-steps included in this process are considered to be generic, enabling governments to choose those steps and components that are most applicable to their situation. With appropriate modifications, it is felt that this process could be helpful to many African countries in addressing issues associated with drought preparedness as an integral part of planning for sustainable development.



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UNITED NATIONS DEVELOPMENT PROGRAMME

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